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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Romance of Dyestuffs

IT is difficult to imagine a more fascinating picture than that drawn of the dyestuff industry by Mr. James Blair, the honorary secretary of the London Section of the Society of Dyers and Colourists, in a lecture which we reproduce in another part of this issue. Here in small compass is a recital of the greatest romance in present-day British industry. The general organisation of a colour works is brought under review, and the claim of dyestuffs to be regarded as a key industry is justified by the reminder that its products are distributed to no fewer than forty different branches of British manufacture. Mr. Blair puts special emphasis on the importance of the standardisation of the products of the industry, and this factor is linked with that what must be regarded in days of high competition as the indispensability of the dyehouse laboratory. The by-ways of the dyestuff industry are no less interesting to explore than the highways. There is little advantage in producing organic chemical compounds which have the property of dyeing certain fabrics and materials in specific shades, unless there is the assurance of a certain degree of fastness to various actions such as light and washing. Without this property of fastness, as Mr. Blair pertinently remarks, these chemical compounds would be merely stains and not dyestuffs. It is at this point that the dyehouse laboratory steps in and tests every product of the dyestuff factory for fastness.

The importance of the dyestuff industry to Great Britain is now almost universally admitted, but the claim has rarely been more completely vindicated than in the paper under review. In order, however, to maintain the protection which the State has given to the industry since the war, the dyestuff makers twelve months ago offered to accept world prices. Mr. Blair is very concerned with the results of this step, although he admits that the makers could hardly have done otherwise. He contends that the price of dyestuffs in this country to-day is far too low, and declares that they are being sold practically at material cost. An immediate disadvantage is that no money can be set aside for systematic and general research, without which there will be no new dyestuffs and no improvement of present products. That is a most unfortunate state of affairs and it may be hoped only a transient one. Better to look upon is the marvellous development of the industry in the last twenty years. Everybody connected with it will wholeheartedly agree with Mr. Blair that it has been tremendously inspiring to have had personal association with the leaders of the industry and with the organic chemists who have given their lives to it.

National Standards

ATTENTION has recently been drawn to changes in the scope of the British Engineering Standards Association. The Association has now been re-organised to permit of its dealing with standardisation questions in the chemical, engineering, building and textile industries, these groups or divisions of industry being controlled by represenative divisional Councils of equal standing. A supplemental Royal Charter has been granted to the Association authorising this re-organisation and changing the title to the "British Standards Institution." This development in the standardising movement, which has grown enormously since the first Committee was set up by The Institution of Civil Engineers in 1901 as the "Engineering Standards Committee," is a clear indication that industry as a whole has increasingly recognised the economic value of the work, and for the first time the chemical and allied industries are possessors of the proper machinery for setting up national standards for chemical materials, plant and apparatus, and for methods of analysis and testing.

The British Standards Institution is an entirely independent body in the closest touch with industrial

requirements and modern technical knowledge and with full Government support but free from Government control. It exists to assist British industry by preparing British Standard Specifications which are based on what is best in present practice and do not attempt to attain an ideal which might be too costly to adopt. It is not a profit making concern and, apart from grants received from the Government and the amount derived from the sale of its publications, it has to look to British industry for the funds necessary to carry on the work. Every British firm and every individual chemist in these industries is eligible to become a subscribing member of the Institution at a nominal fee. Membership carries with it certain valuable privileges and advantages and it is therefore hoped that all manufacturers and others in the chemical industry will co-operate in this work and assist the Chemical Division of the Institution.

Celluloid for Safety Glass

AFTER nearly two years of research a committee, with Dr. Hepworth, of Imperial Chemical Industries, as chairman, has reported that celluloid suitable for use in the manufacture of safety glass can now be made in this country. Safety glass is a sandwich composed of two sheets of glass and celluloid, and the raw materials of the industry have, in the past, been obtainable in large quantities and of the quality required only from the Continent, Germany being the chief source of supply. Mr. Graham Cunningham, the managing director of one of the leading safety glass companies, however, was determined that only British materials should be used in the manufacture of this product, even if the cost of the finished article was slightly higher. In consequence the Safety Glass Committee was formed to discover how far this was practicable, and as a result of the co-operation of the Triplex Co., the British Xylonite Co., and Imperial Chemical Industries, it is now likely that materials in the requisite quantity to meet the demand will be produced in this country at a cost no higher than that for similar materials imported from abroad. The experiments of the Safety Glass Committee have been carried out in different parts of the country. Nitro-cotton, which is one of the components of celluloid, has been produced to the required standard at the Nobel factories, at Ardeer and Stevenston, in Ayrshire. The celluloid itself was made by the British Xylonite Co. at Manningtree, in Essex, whilst the finished product was tested in the Triplex laboratories at King's Norton.

Formaldehyde

THE other day there was a discussion on the question of the most representative organic substance from the point of view of its application in industry. Whilst some, imbued with the traditions of the past, selected benzene, others, with an eye to the potentialities of the future, favoured formaldehyde. This product is steadily gaining in importance, though the total production in this country does not run, as yet, into the thousands of tons per annum which we shall some day hope to see.

Curiously enough, formaldehyde, one of the most unorthodox of substances, is not of great antiquity. The story goes that Hofman, tired of stating in his lectures that the aldehyde of the methyl group was unknown, set to work to prepare it in 1867, and did so without difficulty, the method he used being the oxidation of methyl alcohol over a platinum catalyst. Its polymer had already been prepared by Butlerow in 1850 using methylene iodide.

The unique, almost uncanny, power of formaldehyde to condense and to polymerise is the basis of the synthetic resin industry. Bakelite, plastics from casein, condensation products with urea, all furnish us and our women folk with a hundred and one articles of daily utility; in fact, with a little consideration a harrowing picture could be painted of the tribulations of a maiden of the day waking one morning to a formaldehydeless world. It is an ingredient in the manufacture of synthetic indigo, essential for the sterilisation of imported wool to free it from the dreaded anthrax spore; it kills the flies on the window pane, and is reported to save us from sore throats in the winter. In the past perhaps its price militated against its more general use, but now that synthetic methanol, from which it is manufactured, is available in unlimited quantities, it should be possible to offer it very cheaply. This is one of those fields of chemical enterprise in which all the raw materials are available in this country, so that a little intelligent effort should see the building up of a great and flourishing industry.

Books Received

ARBEITEN UBER KALIDUNGUNG. By Professor Dr. O. Eckstein, Dr. A. Jacob and Dr. F. Alten. Berlin: Verlagsgesellschaft ful Ackerbau-m.b.H. Pp. 236. Rm 6.

INORGANIC CHEMISTRY. By T. Martin Lowry. London: Macmillan and Co., Ltd. Pp. 1101. 25s.

SCIENCE IN ACTION. By E. R. Weidlein and W. A. Hamor. London: McGraw-Hill Publishing Co., Ltd. Pp. 319. 16s.

THE SCIENCE MASTERS' BOOK, Part I: Physics. Part II: Chemistry and Biology. Edited and arranged by G. H. J. Adlam. London: John Murray. Pp. 256 and 267. 7s. 6d. each.

THE SORPTION OF GASES AND VAPOURS BY SOLIDS. By James William McBain. London: George Routledge and Sons, Ltd. Pp. 577. 25s.

THE SOUTH AMERICAN HANDBOOK, 1932. London: Trade and Travel Publications, Ltd. Pp. 626. 2s. 6d.

WHAT IS "PROBABLE ERROR"? By J. F. Tocher. London: The Institute of Chemistry. Pp. 64.

Dr. Clayton on the National Government

DR. G. C. CLAYTON, M.P. for Wirral and a director of Imperial Chemical Industries, in a speech at Hoylake said that the British people had to show the world that this country was going to adopt every possible means to improve its trade. In the new Parliament the official Opposition was useless as a critical force, but the National Government had behind it a following of brilliant young men who would be a spur. Referring to the Abnormal Importations Act, he instanced the case of German manufacturers of celluloid articles who circularised a Manchester firm to the effect that they had sufficient goods in this country to last twelve months, and that their price would therefore remain unaltered in spite of any tariffs. As a result of the Act this kind of thing had been stopped. The buying of large quantities of raw materials which had to be imported at this time of the year, and the abnormal importations in anticipation of tariffs had all helped the depreciation of sterling, but the National Government had been very successful in keeping the purchasing power of the pound in this country at the level of approximately twenty shillings. In due course the depreciation of sterling on foreign exchanges would also be corrected.

Sidelights on the Manufacture of Dyes

By James Blair

We give below extracts from a lecture delivered to the London Section of the Society of Dyers and Colourists, held at Luton, on Tuesday, December 15. The author is Hon. Secretary of the London Section of this Society.

IN the general organisation of a colour works, there is the commercial side and the technical side, and in addition the dyehouse laboratory which is part technical and part commercial. The commercial side is concerned in asking the technical side to prepare certain colours, and distributes those colours as they are prepared. The technical side is concerned with the manufacture of all the various colours the commercial side can sell, or think they can sell, together with an economical disposal of by-products. So many colours are very closely related: it is not possible to make one ton of Oxyphenine Yellow 2G without making a similar quantity of Primuline, so if the commercial side only require Oxyphenine, the technical side must point out to the commercial side they must also sell an equal quantity of Primuline. If an intermediate has to be made specially for a certain colour you can quite understand that all the colours that the intermediate gives rise to can be manufactured.

There is also the research department which is regarded as technical and any new colours which they evolve are placed at the disposal of the commercial side to find a market for them. The dyehouse laboratory therefore plays a very important part in the business of dye making. Great skill is required in the selection for manufacture of products out of the great mass of research results and dyestuff business requires very efficient salesmen as well as skilled chemists. There is first of all the standardising of colours and the testing of the colours made in the works into stock ready for distribution. There is the issuing of pattern cards and information generally about the properties of application of dyestuffs; there is the matching of customers' samples and the answering of technical inquiries as regards any and every application of dyestuffs. All dyestuffs, when isolated, except in special cases when they are sold in the form of so-called pastes, have to be dried, milled and standardised. The drying is either done in vacuum stoves, hot air chambers and canals, or even spray drying is adopted. Milling is done in special mills of the "disintegreter" type or in "ball mills." The colour requires to be very carefully watched in grinding, with some products at a certain stage the particles conglomerate and form small balls which give the appearance of unground colour. The heat produced in grinding also adversely affects some products. A number of dye tests are required to be made at all stages from the colour in the paste form to the finished type product.

Standardisation of Dyes

Products are standardised either as type or as concentrated, according to the requirements of the sales department and according to the stock which is usually kept. Standardisation is done by grinding with a diluent such as salt, anhydrous Glauber salt or dextrine. This is done so that regular deliveries may be made to customers, so that a delivery made to-day and a delivery made a year hence will be identical in strength, shade and dyeing properties. The types and concentrated strengths are fixed by the requirements of the colour user. The type strength of Rhodamine has been fixed as one-fifth the strength of a batch product, so it is possible to buy Rhodamine 100 per cent., that is to say, type, or Rhodamine 500 per cent. strong. This is a powerful colour and by using the type strength the dye user could weigh out in ounces, whereas if he was using the concentrated colour he would have to take very minute quantities, portions of a gram, so you can readily imagine it is very much easier for him to work with the weaker product. I am stressing this point because many colour users imagine the addition of salt or dextrine is made to a dyestuff only to cheapen it and it is this addition which makes the colour manufacturers' profit.

Chrome Blacks are confined to the woollen industry and so they are standardised on wool. Substantive colours are mostly used on cotton so they are standardised on cotton yarn or cotton piece, that is to say, when a pure batch is made a sample from the batch is dyed up in the laboratory against standard both for strength and shade, instructions are then issued to the works to mill this batch with so much salt or instruction may be given to shade it with a small percentage of another colour; if the batch is dull and red a small percentage of a bright green would correct it. Or again the factory stock is examined and a brighter batch than usual is used for shading and mixing with the dull shade dyestuff. Products like Nigrosine, Citronine and Resorcine Brown are tested out on vegetable tanned leather. Many of the direct cotton dyestuffs are tested out on chrome leather, but there is always this danger, the leather industry may be using a colour of which only a small percentage is absorbed by the leather industry the remainder going to the textile industry. The dyestuff may be tested on wool and passed, and may be absolutely correct, but again if it is applied to leather there may be present some uncoupled intermediate which has the property of staining leather, and it is found to be entirely wrong for the leather industry.

Dyestuffs Nomenclature

The question of dyestuff nomenclature must be quite a puzzle to some colour users. To a chemist the chemical name of the dyestuff would convey most information, but it would hardly be possible to use such names as amido azo benzene anthrarufinol disulphonic acid. The colour user is not particularly interested in the chemical composition and would far rather talk about Acid Red, Direct Blues, etc., according to its dyeing properties and so this is the method adopted by the colour manufacturer. Dyestuffs are usually classified according to their behaviour towards the various fibres, so we have acid dyestuffs which have a direct affinity for wool, basic colours which dye wool or tannic mordanted cotton, substantive colours for direct cotton dyeing; mordant dyes which have no direct affinity for fibres and dye fibres which are first treated with metallic salts; vat dyes which are insoluble in water but which on reduction are converted into leuco compounds. Leuco compounds dye the fibre and are easily re-converted into the dyestuff by oxidation either in the air or by weak oxidising agents. In addition, we have the developed colours or ice colours which are actual dyestuffs produced on the fibre. In this case the fibre is padded with an intermediate and the dyestuff produced by diazotising and coupling.

It is necessary to distinguish between a hundred or so types which have similar dyeing properties and the general way is to use letters which theoretically should mean something; for example, Alizarine Sapphire Blue SE—the "SE" means saure echte—the German for fast to perspiration. In direct Sky Blue GS—the "GS" means green shade; 2B would be bluer than B and 8B would be considerably bluer, for example, Kiton Fast Violet 12B is practically a blue. Colours with similar dyeing properties are usually given a class name, for instance, Kiton Acid colours are level dyeing acid colours. A Kiton Fast colour would be an acid colour fast to light. Where a colour is manufactured specially or mixed and shaded to a firm's special requirements, then it is very often followed by the initial letters of the consuming firm, for example, Acid Black JS would mean Acid Black supplied to John Smith. A Yorkshire firm once brought out a Sulphur Black with the initials "KO" and lead it to be generally understood these initials meant "knock out." This product had a very good sale until a rival firm brought out a Sulphur Black "BKO" (evidently of a bluer shade). Another rather interesting use of the letter designation is the "LL" class of fast to light direct cotton colours. We have selected colours in the Chlorantine Fast range which have the highest possible fastness to light and designated these by the letters "LL" after their ordinary letters. There is also the letter "P" in connection with the Anthraquinone Vat colours. The "P" in this case indicated "perfect" and all anthraquinone vats bearing this letter can be used specially in the guaranteed trade.

Fastness of Dyes

The fastness question is one that intimately concerns the dyehouse laboratory and all products are being continually tested for their fastness to light, washing, milling and perspiration. The tests are carried out as a routine matter on general colours and in addition combinations are always being tested in order that suitable recommendations can be made. For example, in dyeing felt hoods it is necessary to have a combination of a red, yellow and blue of equal levelling properties, that is to say, they must dye evenly and approximately at the same rate. It would not do to have a yellow going on first followed by the blue then the red. They must also be similar in fastness to light or if they fade they must fade in a balanced manner; for example, it is desirous if the yellow fades red, the red must fade on to the orange side. If the blue fades violet then the yellow and the red must fade on the green side. Fading, after all, is more often a change of shade than actual destruction of colour although both are of course possible. With indigo you have a perfect dyestuff as regards fading. Many people think that indigo is fast, but it is not fast; exposure to light simply destroys the colour and the products of destruction have no colour, so you get a heavy shade of indigo gradually turning into light blue, but always keeping its tone. Unfortunately very few other dyestuffs possess this very convenient property. This fastness problem is becoming more and more involved and our researches are always aiming at producing faster dyestuffs.

The introduction of the Anthraquinone and Indigoid type of dyestuffs for fabrics resulted in the growth of the guaranteed dye mark in textile materials. The general public, not understanding dye making or dye using, cannot see why every coloured article cannot be guaranteed, that is to say, if the colour does not last the life of the article they want it replaced by a new article. In other words, they know that fast dyes are to be had and they cannot see why they are not to be had on every occasion and for every purpose, or why they cannot have them is due to their higher cost. It is quite possible for material to be dyed with a vat dyestuff and the vat dyestuff to cost almost as much as the material, whereas if it was dyed with an ordinary dyestuff the cost of the dyestuff would only be a small percentage of the material. Again the vat dyestuffs are very difficult to apply; they are themselves actually insoluble. They have to be dyed as leuco compounds and for dyeing them level on yarns and piece goods very complicated machinery is necessary. This explains why when made-up curtains are sent to the dyer and cleaner for a change of shade they cannot be dyed in the same manner as they were when they were new, and sold as guaranteed. Leuco compounds are usually different in colour to the finished shade, consequently there is a very great difficulty in matching the vat colours. In a trade like that practced by the Luton dyers you can imagine their comments if they were asked to use these dyestuffs generally, particularly in their sampling season. The question of light fastness on leather goods too is extremely difficult because here you have a substance which even undyed changes considerably under the action of light. Vegetable tanned leather turns a dark brown; if a fugitive dye is used on this, as the leather substance darkens the brown dye lightens, so you get the peculiar idea prevalent that a fugitive dye like Bismarck Brown is fast on leather.

Price of Dyestuffs

The price of dyestuffs in this country to-day is far too low and I do not say this because the prices of raw materials have advanced owing to the change in currency. This has happened and raw materials are more costly, but even then the price of dyestuffs is far too low. It takes one month to make a batch of Sky Blue. Direct Black has nineteen separate chemical processes in its manufacture. In this country, by conditions which I will explain, we are actually selling dyestuffs practically at material cost; many of them are lower in this country than in any country of the world, and it is not in the interest of colour users that dyestuffs should be sold at material cost or only bearing a small margin of profit. In the dyestuff industry more than any other industry, the consumer relies on the inventive capacity of his supplier. Dyestuffs sold at material cost means that no money can be set aside for systematic and general research. No research means no new dyestuffs and no improvement of present dyestuffs. We can never have any pride in a British organic chemical industry if there is not a steady flow of new products.

Apart from research, technical services have to be paid for. When a pattern card is issued to the leather industry, nothing of very great pretensions can be issued under about £2 per copy. I personally think it was a very wrong thing of the dyestuff makers twelve months ago to make an offer to accept world prices. How can the colour maker in this country guarantee to compete with world prices when he is paying more than double for some of his principal raw materials? I have already referred to the fact that we in this country are bound to pay the price of motor spirit for benzole; imagine the situation in America where you have gasoline at less than 2d. per gallon. The American benzole producer has to go "cap in hand" to the dyestuff manufacturer to dispose of his supplies, and I am afraid he would look very sick if he was offered the price of gasoline for it.

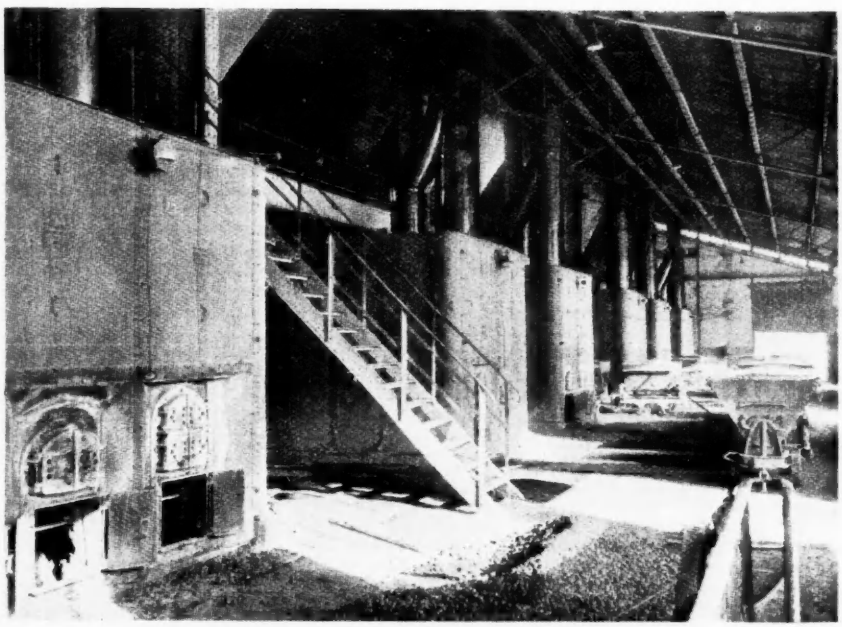
Much of the good work that has been accomplished during the last ten years by the Dyestuff Development Committee and the Dyestuff Advisory Licensing Committee has been negatived by the change in currency. But going back twelve months into the turmoil of that fierce battle for the renewal of the Dyestuffs Act, it seems the makers could hardly have done otherwise. There seemed absolutely no hope of renewing the Act; it was a question like this—the Act has gone, there is no hope for the industry, we might as well make a final gesture. The worst feature of it as I see it is that this particular clause has been applied more to intermediates than to dyestuffs. It would not have been long before the industry was changed back to its pre-war condition and dyestuffs were manufactured in this country solely from imported intermediates. Our foreign competitors would obtain good prices for their dyestuffs behind their tariff walls. In America the tariff on dyestuffs is 45 per cent. of the home selling price, plus 7 cents per lb. Rhodamine B extra was 16s. per lb. in America before the change in currency; they could thus easily afford to sell surplus intermediates at extremely low prices.

South African Tung Oil Experiments

It is reported from Graskop, a small town in the Eastern Transvaal district of Pilgrims Rest, that much interest and importance is being attached to certain Government experiments in the cultivation of the tung trees. Just how far the Government is prepared to go is not known, although it is said that every assistance is being extended in an effort to establish definitely whether these trees can be grown in the area under observation. Recently a statement was published to the effect that there are only 100 tung trees in the whole of the Union and that the majority of these are at Magut, in the Pongolo Valley, where the Government proposes the expenditure of £250,000 on the Pongolo Poort irrigation scheme. However, officials estimate that the limited number mentioned above does not represent more than 5 per cent. of the total in the Union, there being over 2,000 of these nut trees, mostly in the Transvaal.

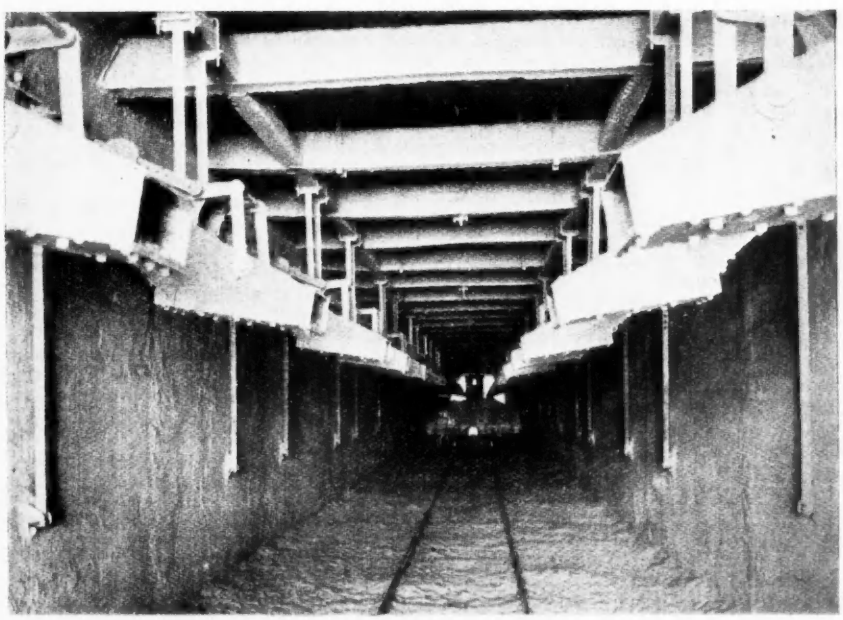
Nitrocellulose Lacquers in France

Nitrocellulose lacquers, introduced in France approximately 5 years ago, have now practically replaced varnishes in the automobile industry, about 75 per cent. of the total paint products used are of nitro-cellulose base and 25 per cent. are varnishes or enamels usually dried in ovens. According to reliable estimates, 4,000 metric tons of lacquers, enamels, and varnishes were consumed in 1929 by the automobile manufacturers. This figure may be brought down to 2,500 tons for 1930 with a further decrease during 1931, due to the serious effect of the general economic crisis upon the automobile industry. The largest automobile factories in France are said to use nitrocellulose lacquers on the bodies of the cars and varnishes or enamels of medium quality on the mudguards and chassis. At present there are between 80 and 100 nitrocellulose paint manufacturers in France but the products having the largest share of the business are two American brands made in France, followed by "Le Franc," "Vit-Lak," "Pyrolac," "Celluco," and "Villemer," of French origin and "Nitrolac" and "Glasso" of German origin now produced in French factories.



The Drying Plant for crude Phosphate Rock at the Mine of Djebel Kouif.

Tunnel for mechanically Loading the Dried Phosphate Rock into Railway Trucks.



COMPETITION FROM NORTH AFRICAN MINES, WHICH ARE NOW THOROUGHLY MODERNISED, HAS CUT INTO THE POSITION OF THE UNITED STATES INTERNATIONALLY IN RESPECT OF PHOSPHATE ROCK. THE ABOVE PHOTOGRAPHS WERE TAKEN AT ONE OF THE MINES OWNED BY THE COMPAGNIE DES PHOSPHATES DE CONSTANTINE, AND ARE REPRODUCED BY PERMISSION OF THE INTERNATIONAL SUPERPHOSPHATE MANUFACTURERS' ASSOCIATION.

Modernised Methods for Phosphate Mining in North Africa.

Lactose: Its Properties and Uses

By D. M. Corrott

The manufacture of lactose, or milk sugar, has developed considerably since the discovery of the biochemical action which makes it able to serve as the basis of a number of preparations. New technical uses are now being found for it, and dairies and casein factories which have at their disposal large quantities of whey are finding that the manufacture of lactose is profitable.

LACTOSE, or milk sugar, is a disaccharid which occurs in true solution in cows milk, to the average extent of 4.7 per cent., giving it a sweetish taste. When 0.6 per cent. of lactic acid is formed milk coagulates spontaneously; the lactose obtained by concentration of the whey is not crystalline. By crystallisation of an aqueous solution of lactose hard crystals with the formula $C_{12}H_{22}O_{11}+H_2O$ are obtained. The presence of a certain quantity of salts in the lactose solution, however, hinders crystallisation. If lactose crystals are heated to a temperature of 110-130° C. they lose their water of crystallisation and if the temperature is raised still higher become yellow and then brown, forming "lactocaramel."

Lactose is insoluble in alcohol and ether but dissolves in hot acetic acid. Another important property is its ready decomposition in solution by bacteria, various types of fermentation being produced by different bacteria, lactic fermentation being the most important. It is therefore of importance in the lactose industry to avoid lactic fermentation in the treatment of whey. Certain mineral salts, such as bichloride of mercury or sulphate of copper, check fermentation, but in sufficiently small quantities encourage it. Salts which, in the proportion of 1/10 of a molecule to the litre, retard lactic fermentation are those of sodium, potassium, lithium, magnesium, calcium, strontium and barium. For salts of iron, magnesium, lead, zinc, uranium and aluminium 1/1,000 of a molecule to the litre is enough to retard fermentation, while 1/1,000,000 of a molecule to the litre is enough for salts of copper, mercury, silver, cadmium, cobalt and nickel.

Lactic Fermentation

A number of bacteria are capable of causing lactic fermentation. They may be differentiated by (1) resistance to heat in liquid media, some being killed by 5 minutes at 60° C., others resisting 10 minutes; (2) the speed with which they coagulate milk at different temperatures; (3) resistance to desiccation; (4) the degree of acidity produced, etc. By the action of these micro-organisms milk is coagulated rapidly between 30° and 35° C. Lactic fermentation ceases at temperatures below 10° and above 45° C. The products are lactic, acetic and carbonic acids, traces of acetone, alcohol and formic acid. Generally, the lactic ferments keep better in a neutral than an acid medium; some are aerobic, others anaerobic or indifferent. They are capable of converting up to 95 per cent. of the lactose into lactic acid if they are provided with peptone. By means of the fungus *Pencillium glaucum* a dextro-lactic acid is obtained; with *Bacillus acidi laevolacti*, a levo-lactic acid. Various other bacteria are capable of decomposing inactive lactic acid produced by fermentation and of consuming one of the active acids produced, leaving the other. Industrially, the most important lactic acid bacteria is *Bacillus caucasious*, which converts lactose to lactic acid; and *Bacterium coli communis*, which coagulates milk rapidly at 24-28° C. producing a quantity of acid and liberating a considerable quantity of CO_2 and hydrogen. In the presence of air the latter produces alcohol, acetic acid, lactic acid, etc.

Practicability of Milk Sugar Manufacture

Whey produced as a result of the precipitation of casein by pressure differs from that obtained by coagulation by acids particularly in its content in lactose and lactic acid. The former contains 4.5 to 5 per cent. of lactose and traces of acetic acid, while the latter contains 3.8 to 4 per cent. of lactose and up to 0.8 per cent. of lactic acid. The various components of whey are not always equally utilisable, which fact makes it important to determine their percentage systematically, taking into account the factors which impede the extraction of lactose and reduces its content for practical purposes. For instance, it is considered satisfactory if 2.5 to 2.8 kg. of lactose are obtained from 100 kg. of milk, about 76.6 kg. of whey being yielded by 100 kg. of milk, but as this amount of whey gives 3.2 to 3.5 per cent. instead of the possible 5 per cent. of lactose only 27 kg. of crude lactose or 2.1 kg. of refined lactose are obtained.

A simple and reliable method of avoiding the harmful action of acidifying bacteria consists in cooling the milk to 12° C., for at this temperature the bacteria can barely exist. Their action is thus checked, but it recommences if the lactose solution is heated to 15°, reaches its maximum between 30° and 40°, then diminishes till it finally ceases between 45° and 50° C. Another simple and economic method is to add a liquid containing gaseous substances which are toxic to the bacteria but which can be eliminated by steam during the concentration of the whey in vacuo. This can be formalin of 40 per cent. strength, to the extent of 0.01 to 0.025 per cent. or a solution of magnesium and sodium bisulphites. An essential features for the profitable manufacture of lactose is the use of really fresh whey; if the whey is sour, its sugar content is so much reduced that lactose extraction is no longer profitable.

Elimination of Impurities

The elimination of fats, albuminoids and salts is more difficult than that of the water. The fats are removed first. If they are present in sufficient quantity for separation to be profitable the whey is centrifuged; if the whey comes from poor milk separation is naturally not profitable, but sometimes the whey is condensed by evaporation till the cream content is high enough for separation. The elimination of albuminoids, salts and any remaining fat is also carried out in highly concentrated whey or in the thick syrup from which the greater part of the water has been removed. In the separation and complete elimination of protein there are serious difficulties. The methods generally used produce such a finely-divided coagulum that filtration is difficult and slow, the pores of the filter soon become blocked by the protein deposit. It is therefore essential to coagulate the albumen in a readily filterable form. When the albuminoid matter is eliminated one of the main causes of lactic acid formation at the expense of lactose is removed for lactic bacterial activity is stopped and there is thus no fear of further losses of sugar. Further laborious filtration is also avoided.

The operation is carried out as follows: First, the whey is neutralised and filtered to separate completely the coagulated protein still in suspension. Excess acidity is then neutralised with calcium or barium carbonate, the latter being preferable because it forms an insoluble sulphate. The liquids thus prepared are sterilised in special autoclaves of galvanised iron, which have been previously sterilised with gaseous formalin, at an initial pressure between 1 to 2 atmospheres. When the liquid is compressed heating is begun by means of a coil, or by passing steam into a double bottom of tinned copper. To ensure rapid and uniform heating the autoclave is fitted with a stirrer which is kept in action during the operation; the exterior of the autoclave is also covered with an insulating material to avoid loss of heat. The maximum temperature to which the liquid is heated is 125° C.; if this is exceeded the whey may become discoloured. Temperature and pressure are maintained for a certain time, while the liquid is constantly agitated. The pressure is then allowed to sink until the liquid boils, and boiling is continued at the same pressure so that the albumen may coagulate. By this process the albumen is coagulated and precipitated almost entirely in the form of granular masses and frequently in a form which is readily separable by filtering, siphoning or decanting. The liquid then passes through mechanical filters to completely eliminate the substances in suspension, the coagulated albumen in the form of compressed cakes being utilised as fertiliser.

The clear filtrate obtained now contains only lactose, the natural inorganic salts and those added during the preceding operations. The concentration of this albumen-free whey is effected in vacuo and almost always in double effect. The evaporation process is complete when the albumen-free whey has reached a density of 30-32° Bé, corresponding to a 60 per cent. concentration. Evaporation is regulated by fans and care is necessary to remove the contents of the vacuum pans before they become viscous and adhere to the apparatus. The contents of the pans are then poured into special crystallising containers and allowed to cool. Some factories employ for this purpose rectangular iron tanks, immersed in others through which cold water is continuously circulating. The mass is stirred gently three or four times while it gradually thickens until after 24 hours it is transformed into a product containing large grains and with an oily layer on its surface.

The crystals of lactose are separated from the "masse-cuite" by centrifuging. The centrifuge usually employed differs from milk separators in working at a lower velocity and intermittently. When the centrifuge has reached the required velocity the mass diluted with cold water is slowly discharged, the liquid passing through the filter and emerging by a special opening. When the cylinder is full the crystalline mass is washed by a jet of cold water; the machine is gradually stopped and a crude lactose of a clear yellow colour is obtained, containing still 10 to 15 per cent. of impurities (albumen, salts, etc.) corresponding to two-thirds of the total lactose originally contained in the whey. The rich syrup left after centrifuging has a density of about 15° Bé and still contains the remaining third of the lactose, together with the rest of the impurities which prevent final crystallisation and must be eliminated.

Purification and Decolourising

Before being put on the market the lactose must be refined. On the Continent this is sometimes done at special refineries and in this case the lactose must be dried to prevent decomposition but if the refining process follows immediately on the preparation of the crude lactose, drying is unnecessary.

To whiten the lactose and remove any flavour and odour, animal or other chars or even decolourising earths are added. At the same time any remaining albuminoid matter is precipitated by the addition of 200 gm. of acetic acid for every 100 kg. of solution, heating to 90°. To eliminate phosphoric acid a little magnesium sulphate is added and the solution is then heated again until a thick scum forms and the liquid becomes clear with the precipitate suspended in large flakes. To remove this precipitate the syrup is filtered while still boiling, using filter presses with a large filtering surface. The residues collected in the presses are washed with water under pressure to free them from any possible remaining lactose, and the compressed cakes when removed is treated with sulphuric acid, which gives a super phosphate of good fertilising value on account of its high content in nitrogen and available phosphate. The clear sugar solution from the filter-presses is ultimately concentrated in vacuo, to a density of 35° Bé and passed whilst boiling into crystallising pans. After the crystallising process, which lasts several days, the syrup is separated by centrifuging from the fine crystals (first product). Further centrifuging gives, in succession, the second and third batches.

These products must undergo further refining to obtain the fine white powder which is the refined lactose of commerce. The sugar is dissolved in the quantity of hot water required to give a density of 15° Bé. The syrup is then boiled with small quantities of aluminium sulphate or calcium chloride or other coagulants to precipitate the colloids (albumen, etc.); subsequently passed through filter-presses and the clear liquid obtained is concentrated in vacuum pans until it reaches its crystallising point, 22° Bé. By centrifuging, a sufficiently white product can be obtained which is dried in rotating tinned cylinders or in hot-air desiccators, allowed to cool and then ground in a porcelain mill. After milling it is then passed through a very fine flour sieve and exposed to the air for a few days.

The most important defects noticed in commercial grades of lactose are over large grains, excessive moisture, yellowish colour, organic impurities and the presence of salts of the heavy metals. Excessive moisture and lack of fineness of the grains are due to insufficient care in manufacture. The yellow coloration may be attributed to either faulty washing or drying at too high a temperature. Organic and inorganic impurities result from the use of unsuitable filters.

Uses of Lactose

Pharmaceutically, refined lactose is used for a number of preparations, the most important of which are milk sugar; diatetic mixtures of milk sugar with 25 per cent. of pure cacao; mixtures of milk sugar and cacao, with a high content of readily digestible iron; "Liebig broth," and similar infant foods rich in maltose and vitamins. The use of lactose in patent foods is spreading. The addition of small quantities of lactose in baking and in biscuit manufacture also enhances the food value. It is also used in the manufacture of chocolate, to which it gives a special flavour; for the coating of sugared almonds; in the preparation of olives, citrons and other preserved fruits, and to increase the content of fermentable sugar in olives for oil extraction by microbiologic methods. In the jam industry it can profitably replace the more readily fermentable sugars. It plays an important part in the preservation of certain fruits already slightly acidulated, and in keeping the firmness of soft fruits such as cherries, strawberries, etc., by forming small quantities of lactic acid which increases their resistance to preservatives and diminishes discoloration. Small quantities of lactose (1 to 2 per cent.) can be used to replace salt, saltpetre, etc., in preserving the flavour, colour and consistency of pork products. In preserving meat both lactose and the small quantities of lactic acid which are formed present as great or even greater advantages from a sanitary standpoint as the nitrates, which cannot be entirely recommended.

Lactose is used also for preserving oilcakes (coconut, sunflower, grapeseed, etc.) containing readily fermentable oils and fats. Here a slight lactic fermentation is produced which protects from oxidation by preventing the development of oxidising products such as olease and makes the cake more appetising and digestible. It can be used for starting and accelerating the development of certain types of lactic fermentation in ensilage; as an excipient for the concentration of fruit juices (orange, lemon, etc.) in vacuo, and for reducing and preserving oxydisable essences. To a certain extent it has also been employed for preserving the latex of rubber, on account of its reducing action and because it opposes resinification; in soap manufacture for stabilising natural organic colours such as that of chlorophyll and for preserving the emulsion and transparency; as a reducing agent in the making of mirrors, and thermo-ionic valves, and as a stabiliser in the manufacture of certain explosives.

Modern Scientific Instruments

Joint Annual Exhibition by Physical and Optical Societies

THE twenty-second annual exhibition of scientific instruments and apparatus, arranged by the Physical and Optical Societies, will on this occasion be held at the Imperial College of Science and Technology, South Kensington, S.W.7, on January 5-7 inclusive. It will be open in the afternoons from 3 p.m. to 6 p.m. and again in the evenings from 7 p.m. to 10 p.m. All the leading manufacturers of scientific instruments will be exhibiting their latest products in the trade section. The research and experimental section will contain contributions from most of the important research laboratories in Great Britain, and there will be a special sub-section devoted to experiments of educational interest. In addition, the work submitted for the Craftsmanship Competition by apprentices and learners will be on view.

Discourses will be delivered each day at 8 p.m. On January 5 Mr. C. C. Paterson, F.Inst.P., M.I.E.E., will deal with "Photocells: The Valves which Operate by Light," the lecture being illustrated by experiments; on January 6, Mr. T. Smith, F.Inst.P., will cover the subject of "Photographic Shutters and their Properties"; and on January 7, Sir Oliver J. Lodge, D.Sc., F.R.S., will speak on "Reminiscences."

Members of Institutions and Societies may obtain tickets from their secretaries; tickets may also be obtained from the Exhibition Secretary, The Institute of Physics, 1 Lowther Gardens, Exhibition Road, S.W.7. Admission on January 7 will, however, be free, without ticket.

Position of the Artificial Silk Industry

Mr. Samuel Courtauld and the Tariff Question

THE prospect of a general tariff system being adopted in this country has not escaped the notice of the artificial silk industry, and according to Mr. Samuel Courtauld, Chairman of Courtaulds, Ltd., in *The Times*, December 12, it seems to have raised hopes in certain quarters which are wholly unjustified.

Suggestions have been made, publicly and privately, that (a) the existing excise duty on artificial silk yarn should be abolished—but without any mention of a corresponding reduction in the import duty—and that (b) the duties on fabrics containing artificial silk should be considerably increased. While Mr. Courtauld is strongly in favour of the latter, he believes that two of the ideas underlying these suggestions are equally fallacious and equally dangerous. Through the abolition of the excise duty it is hoped to add 1s. per lb. to the margin of profit: through the exclusion of imported fabrics containing artificial silk it is hoped to secure such an increased volume of business for home-made yarns as will justify an extension of, or an addition to, existing spinning plants.

Regarding suggestion (a) it is pointed out that artificial silk yarns have enjoyed an adequate degree of protection since 1925, provided by the difference between the import duty of 2s. per lb. and the excise duty of 1s. per lb. It is proved to be adequate by the fact that the percentage of imported to home-made yarn has dropped from over 40 per cent. in 1924 to under 2½ per cent. in 1930. With very few exceptions the range of prices quoted by Courtaulds for artificial silk yarns should yield a satisfactory, though not extravagant, profit, to any factory working to full capacity or near it, efficiently designed and managed, and not overloaded with financial charges. They intend, therefore, to resist any proposal for increased protection of yarns, and, in the unlikely event of the abolition or lowering of the excise duty, they will give the consumer the benefit of corresponding reductions in price, whether the import duty be lowered or no. Moreover, as Courtaulds provide over 50 per cent. of the total artificial silk output of the United Kingdom, they are undoubtedly in a position to prevent any general raising of net prices.

Returns for Imports and Exports

A careful study of the returns of yarn paying Excise duty, and of imports and exports of yarn and fabrics, published by the Board of Trade, reveals the following facts for the three quarters ended September 30, 1931: (1) The United Kingdom now produces 48,290,000 lb. of artificial silk yarn per annum; (2) it imports 1,646,000 lb. of artificial silk as yarn; (3) it imports 13,647,000 lb. of artificial silk in fabrics; (4) 1,008,000 lb. are re-exported as yarn and in fabrics; and (5) the net total of artificial silk imported into, and finally consumed in, this country is 14,285,000 lb. per annum. This last is the total extra weight which United Kingdom yarn factories would be called on to provide if every pound of foreign imports were excluded. Courtaulds, Ltd., alone have machinery installed which is capable of producing 20,000,000 lb. per annum beyond their recent output, without any speeding up. Other companies must be in a similar position, and, at a very conservative estimate, factories in operation to-day, without the addition of a single spindle, could increase their recent production by an amount twice as great as the total amount of artificial silk imported into this country in any stage of manufacture.

Commenting on these views, Mr. Ernest Walls, chairman North British Artificial Silk, Ltd., and the Rayon Marketing Co., Ltd., in a letter to *The Times*, December 15, says that since the problem of the rayon industry, as Mr. Courtauld's analysis clearly shows, is to find sufficient outlet for its capacity, it is reasonable to suppose that, if the price of rayon came down by the shilling at present paid as Excise duty, the result would be some contribution towards providing employment for the unemployed spindles referred to in Mr. Courtauld's statement. That the price would be reduced by the amount of the Excise duty is elementary, since an Excise duty is a form of revenue tax collected at the source, and the public is accustomed to price adjustments when Excise duties are altered. Mr. Courtauld says that, in the event of the abolition or lowering of the Excise duty, his company would give the consumer the benefit. The consumer would expect and demand it, as always with Excise duties, whatever policy the company adopted.

In the opinion of Mr. Walls the Excise duty, by raising the selling price unduly, has been a great factor in preventing an increase in *per capita* consumption comparable with other countries in recent years. Further, it is a heavy financial burden on a new industry, locking up a large amount of working capital, which could be employed in the developments which are constant in a new industry. Finally, if it was reasonable when it was imposed it is unreasonable to-day. The net selling price when the duty was imposed was three times the present net price. Thus its incidence is now threefold; when Excise duties are increased beyond the safety point it is well known that they tend to reduce consumption.

Trade with South Africa

Imports of Drugs, Chemicals and Fertilisers

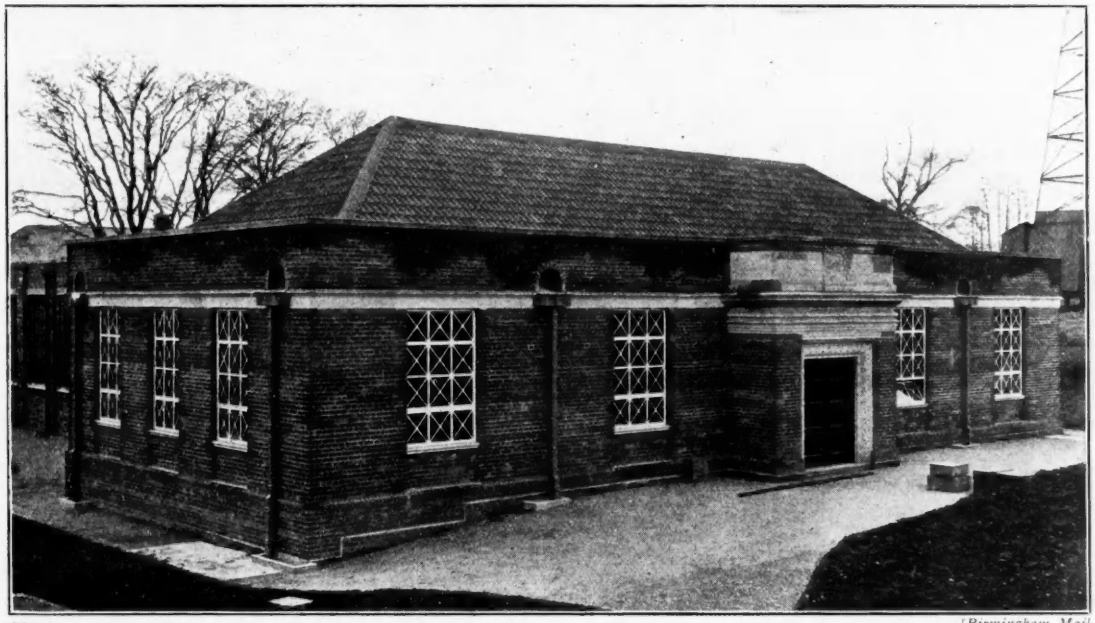
THE outstanding feature in South African trade as outlined in the recent Report on Economic Conditions in the Union (H.M. Stationery Office, price 2s. net.) is the welcome general increase in the percentage of import trade enjoyed by the United Kingdom in 1930 and maintained throughout the first quarter of 1931. Unfortunately this is not due to definite gain over competitors but to a heavier fall in the value of imports in classes not normally supplied by this country.

Imports of drugs, chemicals and fertilisers, however, diminished in value from the high figure of £2,870,975 recorded in 1928 to £2,818,296 and £2,626,153 in the two following years. The largest individual decrease in the last year was one of £72,000 in imports of sodium nitrate for manufacturing purposes. The United Kingdom share of trade in the whole class has diminished from 43.3 per cent. to 42.2 per cent. Chemicals account for nearly half the total value of imports in the class. The United Kingdom share of the trade has been fairly steady at about 47 per cent. during the past three years. Among the many small items included the most important in value are:—sodium cyanide, of which imports have been growing steadily lately, dependent, of course, on the growth of the gold mining industry—about 46½ per cent. of the 1930 imports valued at £303,847 were from the United Kingdom; crude glycerine imports in 1930 valued at £103,924, all from foreign sources, and glycerine distilled in bulk, was valued at £125,762, of which 90 per cent. was from the United Kingdom; sodium nitrate, imports in 1930 valued at £155,695 practically all from Chile, and caustic soda, 1930 imports £71,538, of which £60,613 was of United Kingdom origin.

In drugs imports were somewhat lower in value in 1930 at £405,076 as compared with rather over £520,000 in each of the previous two years. The United Kingdom share was also lower at 62.4 per cent. as compared with 64½ per cent. and 65½ per cent. in 1929 and 1928. The value of imports in perfumery and toilet preparations was well maintained at £386,949 as against £397,270 and £356,185 in previous years.

Imports of paints, pigments and colours were very high in 1929 at over £450,000 but dropped by nearly 20 per cent in 1930 to £363,488. The United Kingdom share of trade in both years was low at about 57½ per cent. Distempers, colourwashes and waterpaints are still imported mainly from the United States. Other ready mixed paints rose in value in 1929 to £195,502 but decreased again in 1930 to £168,383, almost the same figure as in 1928; the share of the United Kingdom which by 1928 had already fallen to 69 per cent., fell heavily in 1929 to 59.7 per cent., and rose slightly in 1930 to 60.8 per cent. The United States and Holland are the chief competitors. Imports of white lead in oil are decreasing and in 1930 were less than half of the 1927 figure: the remaining imports are derived mainly from the United Kingdom. Varnish, stains, lacquers, japan, etc., were very low in both quantity and value in 1930, at 80,498 gallons valued at £37,475. The United Kingdom share of trade at over 71 per cent. by value was higher than the two previous years.

The value of imported soaps in 1930 was £94,280 as compared with £103,062 and £109,047 in the two previous years; the volume of trade has been well maintained except for some reduction in toilet soaps.



Photo] *[Birmingham Mail*

BIRMINGHAM UNIVERSITY: NEW ORE DRESSING LABORATORY.

A New Ore-Dressing Laboratory

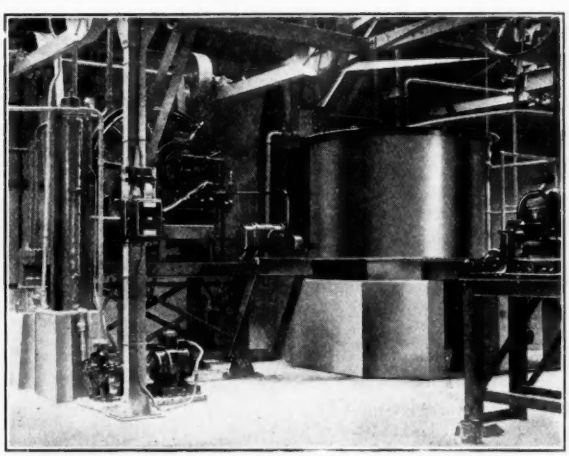
Extension to Birmingham University

THE completion of a scheme for the gradual reconstruction and re-equipment of the Mining Department at Birmingham University was reached on Wednesday, December 16, when Sir Robert Horne formally opened the new ore-dressing laboratory.

The object of this ore-dressing laboratory is to provide the means for demonstrating ore-dressing processes by a trained staff and also to enable students to conduct these operations themselves. In addition, it will provide facilities for research on problems connected with ore-dressing. The plant has been designed to allow continuous running in sequence of the various machines, and the flow sheet is such that it can be used for treatment of the ores of gold and silver, copper, lead, zinc and tin. Provision has also been made for demonstrating the application of magnetic separation to magnetic iron ores, and also to other minerals of low magnetic susceptibility such as wolframite, monazite sands, zinc blende, etc. The student will thus be afforded experience in the most up-to-date methods of treating most of the ores that he is likely to meet in his professional career, and at the same time will obtain instruction in the basic principles of the art, in order that he may be able to apply these to problems connected with the less common minerals and non-metallic ores.

Birmingham University has long been equipped with an ore-dressing laboratory, which rendered good service in the past, but as the plant was installed about 30 years ago it could not be modified so as to provide facilities for present-day practice. The old ore-dressing equipment in the main was therefore scrapped, and the space occupied by it has been utilised to give additional accommodation in the form of a new drawing office, a department library and extra rooms for the British Colliery Owners' research laboratory. These alterations, together with the provision of a gallery over one side of the museum, a surveying instrument room in the main building, and a new building to provide a workshop, camp store and cloakroom accommodation for students working in the new laboratories, have been paid for by the grant from the Miners' Welfare Fund, amounting to £6,000. Since 1925 the Central Committee of this fund have granted in all £19,700 to assist in the work of reconstruction. In addition coal-mining machinery manufacturers and others associated with the industry have given to the University equipment to the value of about £7,000 and concessions in the purchase of equipment which amount to over £3,000.

In addition to the sections mentioned above, the Mining Department at Birmingham University includes a mine rescue laboratory, a museum which holds historical collections of safety lamps and mining tools, cases of mineral specimens of all kinds from the principal coal and metal mines of the world, and a large number of scale and working models; coal-mining laboratories, in which operations on the chemical side of mining are dealt with; a safety-lamp testing room; a mining research laboratory devoted to the prosecution of full-time work on problems connected with the industry; a drawing-office and library; and an experimental mine. The workings of this mine, which is situated in the University grounds, cover about an acre of ground and embrace both longwall and pillar-and-stall methods, the roadways being about a mile in length. Here also are practised rescue operations, which are conducted in a heavily smoke-laden atmosphere, in which the wearer is entirely dependent on his apparatus and acquires confidence in it. One of the objects of the coal treatment laboratory is to solve the problem of the treatment of coal below $\frac{3}{8}$ in.



INTERIOR VIEW SHOWING ORE-DRESSING EQUIPMENT.

British Overseas Chemical Trade in November

"Dumping" Continues

THE Board of Trade returns for November show an increase in the value of imports compared with November, 1930, of £3,793,000, or 4.7 per cent., a decline of £12,194,000, or 27.6 per cent. in exports, and a decrease of £1,882,000, or 17.2 per cent., in re-exports. The apparent adverse balance of trade for the month was £46,401,000, compared with £28,526,000 in November, 1930. For the 11 months of the current year the adverse balance of trade was £369,621,000, against £341,395,000 in 1930, and 342,256,000 in 1929. Comparison of the November returns with those for the previous month is not a level one, since there were two working days less in November. In spite of this fact imports increased by £3,147,000, or 3.9 per cent, the effect, probably, of anticipations of import duties. Imports of raw material were larger by £3,430,000 and imports of manufactured goods by £1,429,000. Imports of iron and steel show an increase of £740,000.

Exports of chemicals, drugs, dyes and colours during November amounted to a total of £1,450,924, which is £118,077 lower than in November, 1930. Imports totalling £1,839,393 were higher by £980,951, and re-exports totalling £51,611 were lower by £1,883, as compared with November, 1930.

The statistics for exports and imports during each of the past eleven months are set out below, showing percentage fall or rise calculated on figures for the corresponding months of last year:—

	Jan.	Feb.	Mar.	Apr.	May	June
Exports	– 36.5	– 40.5	– 30.5	– 19.4	– 15.4	– 10.0
Imports	– 22.7	– 11.3	– 13.2	+ 4.8	– 16.4	– 7.8

	July	Aug.	Sept.	Oct.	Nov.
Exports	– 21.5	– 26.3	– 24.7	– 24.9	– 6.8
Imports	– 11.4	– 11.5	– 1.1	+ 26.8	+ 114.3

For the eleven months of this year exports have dropped £4,726,404 and imports have risen £226,200 in comparison with figures for the corresponding period of 1930.

	Quantities. Month ended November 30. 1930.	1931.	Value. Month ended November 30. 1930.	1930.
Imports			£	£
CHEMICAL MANUFACTURES AND PRODUCTS (other than Drugs and Dye-stuffs)—				
Acetic anhydride cwt.	168	555	515	1,642
Acid, Acetic .. tons	460	1,622	16,064	58,160
Acid, Tartaric .. cwt.	2,942	6,826	15,400	35,726
Bleaching materials ,,	4,185	10,621	9,435	29,992
Borax .. .. ,,	13,755	12,185	8,028	7,383
Calcium carbide ,,	64,443	90,834	39,756	56,557
Coal tar products, not elsewhere specified ..	—	—	2,311	4,968
Glycerine, Crude cwt.	1,223	171	1,893	230
Glycerine, Distilled ,,	1,515	1,593	3,295	3,510
Red Lead and Orange Lead ,,	3,282	7,243	4,665	9,698
Nickel Oxide .. ,,	—	—	—	—
Potassium Nitrate (saltpetre)	13,194	5,599	11,894	4,598
Other Potassium Compounds .. ,,	134,123	262,842	46,739	102,956
Sodium Nitrate ,,	56,234	550,865	26,637	201,148
Other Sodium Compounds .. ,,	31,798	35,970	18,409	24,987
Tartar, Cream of ,,	2,401	2,702	10,000	11,281
Zinc Oxide .. tons	944	950	15,525	20,020
All other sorts .. value	—	—	182,113	443,106
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .. .. ozs.	114,127	371,227	8,254	30,887
Bark Cinchona (Bark Peruvian, etc.) cwt.	589	1,891	2,287	10,078
All other sorts .. value	—	—	138,581	181,808
DYES AND DYE-STUFFS—				
Intermediate Coal Tar Products .. cwt.	44	119	452	738
Alizarine .. ,,	33	—	1,915	—
Indigo, Synthetic ,,	—	—	—	—
Other sorts .. ,,	3,651	8,362	86,864	206,619
EXTRACTS FOR DYEING—				
Cutch .. .. ,,	1,201	1,649	2,116	2,560
All other sorts .. ,,	1,060	4,887	4,880	15,401
Indigo, Natural ,,	37	2	760	40
Extracts for Tanning (solid or liquid) cwt.	64,723	139,285	62,637	112,619
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground cwt.	31,180	53,280	6,934	10,685
White Lead (dry) ,,	15,179	22,124	22,612	29,505
All other sorts .. ,,	82,699	171,882	107,471	222,491
Total of Chemicals, Drugs, Dyes, and Colours .. value	—	—	858,442	1,839,393

	Quantities. Month ended November 30. 1930.	1931.	Value. Month ended November 30. 1930.	1930.
Exports			£	£
CHEMICAL MANUFACTURES AND PRODUCTS—				
Acid, Sulphuric cwt.	1,590	2,613	1,794	1,734
Acid, Tartaric .. ,,	1,154	1,585	6,405	7,577
AMMONIUM COMPOUNDS—				
Chloride (Muriate) tons	465	375	7,524	6,325
Sulphate—				
To Spain and Canaries tons	13,265	23,138	93,009	118,440
,, Italy .. ,,	670	—	5,716	—
,, Dutch East Indies tons	3,123	1,770	23,369	9,830
,, China (including Hong Kong (tons	3,987	741	29,885	3,840
,, Japan .. ,,	2,003	2,168	14,025	11,208
,, British West India Islands and British Guiana tons	489	576	3,540	2,914
,, Other Countries tons	14,509	9,708	103,848	50,617
Total .. ,,	38,046	38,101	273,392	196,849
Bleaching Powder (Chloride of Lime) .. cwt.	47,424	45,634	13,997	14,420
COAL TAR PRODUCTS—				
Anthracene .. cwt.	304	1	102	1
Benzol and Toluol gal.	5,499	9,407	478	749
Carbolic Acid (crude) ..	1,441 cwt.	885 gal.	1,948	147
Carbolic Acid (crystals)	898 cwt.	1,209 cwt.	2,951	2,972
Cresylic Acid	89,532 gal.	69,177 gal.	9,483	6,995
Naphtha .. gal.	1,685	6,392	220	546
Naphthalene (excluding Naphthalene Oil) cwt.	11,466	9,606	2,915	2,254
Tar Oil, Creosote Oil, etc. .. .. gal.	1,327,504	849,849	33,427	19,246
Other sorts .. cwt.	8,704	8,289	7,151	10,138
Total .. value	—	—	58,675	43,048
Copper, Sulphate of tons	2,344	2,421	42,496	38,786
Disinfectants, Insecticides, etc. .. .. cwt.	33,568	39,588	81,913	86,373
Glycerine, Crude .. ,,	2,274	2,301	3,214	2,380
Glycerine, Distilled ,,	8,503	12,606	22,464	27,232
Total .. ,,	10,777	14,907	25,678	29,612
POTASSIUM COMPOUNDS—				
Chromate and Bichromate .. .. cwt.	1,118	2,703	2,308	6,274
Nitrate (Saltpetre) ..	1,246	1,214	2,347	2,196
All Other Compounds cwt.	1,080	4,105	7,391	7,911
Total .. ,,	3,444	8,022	12,046	16,381

	Quantities. Month ended November 30. 1930.	1931.	Value. Month ended November 30. 1930. £	1930. £
SODIUM COMPOUNDS—				
Carbonate, including Soda Crystals, Soda Ash and Bicarbonate cwt.	258,093	199,209	72,258	56,840
Caustic .. .. ,,	142,070	104,633	99,705	71,121
Chromate and Bichromate .. .. cwt.	3,276	3,168	4,888	5,583
Sulphur, including Salt Cake .. .. cwt.	169,871	126,868	23,193	14,775
All Other Compounds cwt.	38,857	73,110	41,510	75,508
Total .. ,,	612,167	506,988	241,554	223,827
Zinc Oxide .. tons	265	529	6,717	11,069
All Other Sorts .. value	—	—	249,399	251,521
Total of Chemical Manufactures and Products (other than Drugs and Dye-stuffs) value	—	—	1,021,590	927,522
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .. .. ozs.	88,658	124,669	9,487	14,168
All Other Sorts value	—	—	251,333	218,394
Total .. ,,	—	—	260,820	232,562
DYES AND DYESTUFFS—				
Products of Coal Tar cwt.	4,930	9,617	58,612	87,413
Other Sorts .. ,,	8,503	11,832	7,747	10,212
Total .. ,,	13,433	21,449	66,359	97,625
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground cwt.	2,619	3,111	1,066	1,104
White Lead (dry) ,,	1,765	1,470	3,184	3,057
Paints and Colours in Paste Form .. cwt.	27,229	24,861	50,285	44,631
Paints and Enamels prepared (including ready mixed) .. cwt.	30,752	26,224	97,585	73,602
All Other Sorts ,,	40,837	42,751	68,112	70,821
Total .. ,,	103,202	98,417	220,232	193,215
Total of Chemicals, Drugs, Dyes and Colours .. value	—	—	1,569,001	1,450,924
Re-exports				
CHEMICAL MANUFACTURES AND PRODUCTS (other than Drugs and Dye-stuffs)—				
Acid, Tartaric, including Tartrates .. cwt.	152	50	910	350
Borax .. .. ,,	524	989	400	636
Coal Tar Products, not elsewhere specified value	—	—	1	5
Potassium Nitrate (Saltpetre) .. cwt.	36	48	50	76
Sodium Nitrate ,,	600	1,342	277	572
Tartar, Cream of ,,	288	283	1,510	1,277
All Other Sorts value	—	—	14,259	12,969
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .. .. ozs.	17,155	5,910	1,560	619
Bark Cinchona (Bark Peruvian, etc.) cwt.	25	259	91	2,143
All Other Sorts value	—	—	28,043	24,903
EXTRACTS FOR DYEING—				
Cutch .. .. cwt.	559	965	893	1,825
All Other Sorts ,,	79	140	1,043	683
Indigo, Natural ,,	2	4	54	90
Extracts for Tanning cwt.	2,462	3,797	2,713	3,848
PAINTERS' COLOURS AND MATERIALS .. cwt.	951	588	1,441	1,391
Total of Chemicals, Drugs, Dyes and Colours .. value	—	—	53,494	51,611

Fan Erosion by Dust

The Solution of a Serious Problem

ONE of the latest troubles in power station practice is the erosion of induced draught fans and accessory equipment because of the growing use of much higher combustion gas velocities through the boilers, economisers, and air heaters, with the object of increasing the rate of heat transmission. Naturally such conditions mean that the induced draught fans are required to run at greater peripherical speed, and to-day 10-12 in. water gauge suction is quite common practice, and even up to 16 in. water gauge is now being considered, whereas until quite recently about 4-6 in. was the normal figure for the most modern power station, and about 2-2½ in. for general industrial boiler plants.

It is well known that enormous amounts of dust are present in combustion gases, anything from 1 to 10 per cent. on total weight of coal burned, or even more. That is with a plant burning 1,000 tons of coal per day, 10 to 100 tons of abrasive dust may pass through the fans in 24 hours, and mostly during the day shift. The velocity of the combustion gases has to be so high when going through the fan that an actual sand blast action is set up, with serious results on the fan casing and runner and also auxiliaries such as dampers. The trouble is further magnified because, for a given volume of gases, the fan itself has to be made smaller as the water gauge is increased, and therefore the actual surface of metal exposed to the abrasive action of the dust is decreased, thus rendering the erosive effect still more acute. Additional complications are also that dusts vary greatly in abrasive character depending upon the amount, nature, and size of the particles.

The matter is so serious that in the United States the whole of the fan makers refuse to give any guarantee against erosion from dust under conditions of high water gauges. A great advance, however, has now been made in this field by Davidson and Co., Ltd., of Belfast, whose latest practice is to instal their well known centrifugal dust collectors, which operate without water sprays on the suction side of the induced draught fan, thereby removing, according to the conditions, 80-95 per cent. of the total dust before the fan is reached. Consequently the cause of the trouble is removed while the velocity through the collectors of comparatively large size particles is, of course, much lower and the abrasive action at this point practically nil.

Construction of Air Receivers

New British Standard Specifications

USERS of receivers and bottles for compressed air will be directly interested in three new British Standard Specifications for air receivers which have just been issued by the British Standards Institution. It is understood that these form part of a series of specifications for different air receivers which is being prepared covering different methods of construction and are the outcome of representations made by the Home Office.

The three new specifications are No. 428- 1931, for Forge Welded Steel Air Receivers, No. 429-1931, for Riveted Steel Air Receivers, and No. 430-1931, for Solid Drawn Steel Air Receivers. Each specification provides for the quality of material used, the method of construction, formulæ for the determination of plate and end thicknesses and requirements for workmanship and testing. The specification for forge welded air receivers also lays down details as to the methods of making forge welded joints for attaching the ends and also for inlet and outlet connections, and the riveted air receiver specification lays down requirements for efficiencies of joints, thickness of butt straps, methods of riveting and the staying of end plates. Adequate provision is also made for suitable access, for examination of the interior surface, drainage, and the necessary strengthening of the plates where holes have been cut.

In the preparation of these specifications careful consideration was given to existing regulations covering the construction of unfired pressure vessels and they therefore represent a unification of these regulations which has been accepted by the authorities responsible for their preparation. Copies may be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

A New Grade in Filter Papers

Freedom from Risk of Breaking

WHATMAN filter papers are manufactured by W. & R. Balston, Ltd., at Maidstone, Kent, where for more than a century and a half drawing and writing papers have made the name Whatman synonymous throughout the world with fine paper making. The manufacture of filter papers was undertaken at the commencement of the War, owing to the difficulty of importation of the makes previously in use, but the unique experience of the firm at this mill enabled them not only to reproduce but to improve upon the imported papers. In Whatman filter papers there is a special variety available for each separate problem which confronts the chemist, whether working in research, educational or industrial laboratory. Their latest grade (No. 54) has an ash-weight as low as that of their "single acid-washed" papers, but its outstanding features are that it filters rapidly; has immense wet strength, so that it can be used as very large circles without fear of breaking or bursting; and will withstand the action of caustic solutions up to almost any strength, whilst being more resistant to acids than are the usual types of filter paper. Grade No. 54, however, is not adapted for very fine precipitates. In working with a coarse precipitate or fine crystals, the collected material can be scraped off if necessary, enabling the paper to be re-used for several filtrations after washing it under the tap. Circles are supplied in fifteen different sizes ranging from 4 to 61 cm. diameter. The largest size has an ash weight of only 0.0106 grams per circle.

THE WHATMAN FILTER PAPER MILLS, MAIDSTONE, KENT.

All Whatman filter papers are packed in cardboard boxes, each containing 100 circles, distinctly labelled. The boxes of acid washed grades are sealed in glassine paper, which keeps the papers clean and free from contamination. Stocks are carried by all laboratory furnishers.

Prospects of Revival in the Fertiliser Industry

IN the course of his speech at the fourteenth ordinary general meeting of the Anglo-Continental Guano Works, Ltd., held in London last week, Sir Archibald Mitchelson, Bt., chairman of the Company, said that the dumping of foreign agricultural produce and of superphosphate has continued unabated and values have fallen further. The output from the company's group of factories showed an average falling off of 20 per cent. Coupled with reduced selling prices this decline was so serious that only by the strictest economy and a close watch on all details of factory expenses had it been possible to avoid loss on a large part of the fertiliser business. If agriculture can be helped, with more land brought under the plough and the unfair dumping of surplus foreign superphosphates properly controlled, it was his opinion that the Company's various fertiliser factories should get back to a full output. Price, he said, was of less importance than a full production, by reason of the better spreading of overhead charges. In fact, low as the present selling prices undoubtedly are, there may be no need to raise them under a tariff, always assuming that the first cost of raw materials does not increase.

Spanish Government Reserves Potash Rights

As a result of the discovery of rich deposits of potash salts in the Province of Navarre, the Spanish Government has issued a decree which definitely reserves to the State the part of the potash zone in the Province of Navarre which has been explored by it. The area involved is 19,000 hectares.

Reorganisation of Cosach

Committee's Findings

THE Minister of Finance to the Chilean Government has now released the findings of the official Committee appointed to submit recommendations relative to Cosach. The Report begins by stating that Law 4863 was violated when Cosach was first organised, because the capital was larger than the amount authorised. The spirit of the law contemplated equality of conditions as to rights and benefits between the State and producers, whereas such conditions do not now exist.

The Committee concedes, however, that present circumstances make it advisable to uphold Cosach, but says that the organisation must be modified so as to comply with the law which created it. Its indebtedness should be reduced and proper revision should be made of the individual contributory valuations, which latter ought to be exchanged for B shares in such a manner that fairness of allotment and the interests of the Government and the producers are safeguarded. In order to place the company within the spirit and terms of the law and upon a basis of complete equality as between the Government and the contributory companies, it would be necessary to convert all bonds into shares excepting $19,000,000 underwritten by the National City Co., £3,000,000 sold to Europe, and those allotted to the Government, reducing proportionately the bond guarantee of 60 pesos per ton of nitrate shipped.

The Report further suggests that Cosach should be obliged to select within ten years the nitrate reserves contemplated in the law, after which the Government is to have the right to dispose of reserves to independent producers upon certain conditions. It also insists that the Government, as owner of all the A shares, which after the modifications recommended will be equal in number to the B shares, should have a sufficient numerical representation on the board and on all committees, with power to veto any resolutions.

The Chemist and Modern Agriculture

Difficulties of the Early Agricultural Chemist

ON Thursday, December 10, a lecture on "The Chemist and Modern Agriculture" was given at the Technical College, Derby, to the local section of the Institute of Chemistry, by Mr. H. T. Cranfield, who is the Ministry of Agriculture's Advisory Chemist, Midland Agricultural College, Sutton Bonington, Loughborough.

In the course of this lecture Mr. Cranfield referred to the great importance of this industry in the history of the development of man, and explained how the development of the experimental sciences in the 18th and 19th centuries had materially benefited this great industry. Brief reference was made to the work of Bouissingault, Lawes, Gilbert and Liebig and their influence on the development of field experimental work. The difficulties under which the early agricultural chemist worked, owing to the lack of co-ordinated effort, were also dealt with. The scheme for assistance to agricultural scientific research which was inaugurated by the Board of Agriculture in co-operation with County Authorities, towards the end of last century, and which was strengthened by the formation of the Development Commission in recent years, has been the means of raising agricultural research in this country to a high plane. Recently, efforts have been made to co-ordinate the agricultural research of the British Empire, and machinery is now in operation by which workers in all parts of the Empire can keep in close touch with one another through various agricultural scientific bureau.

The lecturer also presented tables indicating the chief branches of agricultural chemical research involving soils, manures, plants and animals, in which chemists are now engaged, and explained in detail many problems which are now being investigated at the various research stations.

Trade with New Zealand

A CONFIDENTIAL Memorandum on trade with New Zealand has been prepared by H.M. Trade Commissioner at Wellington, and is being issued by the Department of Overseas Trade to firms whose names are entered on its Special Register. United Kingdom firms desirous of obtaining a copy of this memorandum should apply to the Department, 35 Old Queen Street, London, S.W.1, quoting reference No. C.X 3714.

The Development of a New Moulding Compound

By A. M. Howald

Early in 1931, Toledo Synthetic Products, Inc., of Toledo, Ohio, began the commercial production of "Plaskon," a new urea-base compound for hot-moulding. The research that created this product and the subsequent technical development of the results are here described by an Industrial Fellow of Mellon Institute, where a series of Fellowships were sustained by the Toledo Scale Co.

THE Toledo Scale Co., in its efforts to improve the design and performance of the various types of scales manufactured by it, had encountered limitations imposed by available materials, none of which combined the desired qualities of strength, light weight, whiteness or light colours, and, for some applications, transparency. Actual experimental work followed only a thorough study of the then commercially available materials, as well as of those materials known to be in advanced stages of subcommercial development. While it has been possible to make some application of both aluminum and phenolic molding compounds to scale construction, with consequent decreases in weight, none of the available materials showed promise of meeting the other exacting specifications originally imposed by the fellowship donor.

Urea-Formaldehyde in the Past

Amorphous, gummy, or resinous condensation derivatives of urea with formaldehyde were described as early as 1897 by Goldschmidt (*Ber.*, 29, 2438, 1896; *Chem.-Ztg.*, 21, 460, 1897) and in 1908 by Einhorn and Hamburger (*Ber.*, 41, 24, 1908). Working prior to the age of interest in synthetic plastics, these investigators probably were less desirous of preparing infusible amorphous substances than of making more simple, crystallizable derivatives which they could purify.

John seems to have been the first to foresee the commercial possibilities of the glassy gelled products and purposely to prepare them (U.S. Pat. 1,355,834, 1920). He emphasised condensation without "catalysts" and in his application described his products as being useful as glue, rubber, and glass substitutes. Following John, numerous patentees have described alleged improvements on his methods. As John had disclaimed the use of "catalysts," subsequent patentees usually feature them. Since John's invention, in fact, the patent record of urea-formaldehyde condensation has become a maze of claims and counterclaims representing numerous patentees and from which, commercially speaking, three plastics for hot-moulding based on the ureas have emerged in this country. These differ widely among themselves and from other plastics in chemical and physical composition and in technique of moulding.

Primary Investigations

In order to obtain preliminary ideas as to methods of attack, both in improving urea plastics and in making them mouldable, cast products were prepared at Mellon Institute according to existing knowledge. These had the well-known weaknesses of high water absorption, cracking with weather changes or on exposure to light, and lack of uniformity. A few pieces accidentally made by the Fellowship and some specimens obtained from others showed properties so far superior to those of the average sample that confidence in the fundamental soundness of the urea-formaldehyde reaction for the preparation of desirable plastics was established. A detailed literature and laboratory study was then made of all the reaction possibilities between urea and formaldehyde, whether crystalline or amorphous products were produced. As a conclusion from this investigation, it was decided that the usual weaknesses of the older urea-formaldehyde resins were not a necessary concomitant of their source but were due to certain preventable causes, including (1) uncombined reactants, namely, ureas, usually simple urea or thiourea, and formaldehyde; (2) crystalline and soluble hyproducts from side reactions; (3) incorrect ratios of reactants; (4) incomplete conversion from the soluble to the insoluble form of condensate and (5) mechanical strains arising from the evaporation of water or other solvent or of formaldehyde after finishing.

By continued systematic research covering several years, embracing particular attention to one or two of these causative factors at a time and the testing of all products for hot and cold water absorption and with ultra-violet light, it was found possible to produce transparent or filled masses with water absorption as low as 0.05 per cent. in 24 hours, unaffected by any exposure to ultra-violet light and resistant to boiling water on exposures up to one-half hour. Another line of investigation, carried on simultaneously, was a study of the conditions under which the resin could be formed by conventional methods of hot-pressing as applied to phenolic compounds.

After sufficient basic progress had been made on the laboratory scale, a small pilot plant was built at Mellon Institute for the study of production and moulding methods.

Commercialisation of Research

During 1930 it became apparent to the Toledo Scale Co., not only that "Plaskon" had many applications other than in scale fabrication, but that its manufacture, distribution, and further research development were highly specialised and could be better undertaken by a separate organisation. Accordingly, the present Toledo Synthetic Products, Inc., was formed for this purpose. Then, after several months of installation of equipment and of plant production research, controlled by laboratory testing and co-operative practical moulding, "Plaskon" moulding compound was offered for other uses. Unlike many co-products of research, however, it is receiving successful and growing application for its original purpose, namely, in scale construction and housing.

"Plaskon" is produced commercially as either a granular or a very fine powder. Under the influences of heat and pressure, according to the usual practice of hot-moulding, it first becomes plastic, then sets strong and rigid. The granular form is controlled in density and particle size to permit the easy production of preforms in standard machines, yet not to show signs in the finished moulding of either granule or preform structure. The bulk ratio between granular compound and finished moulding is about 3 to 1.

The best steam pressure for moulding depends on the thickness of the section, mould design as influencing heat transfer and speed of ejection, depth of flow, available pressure, and other conditions. Thin shallow mouldings of perhaps 3/16 in. wall thickness or less, up to 2 in. in depth, may be advantageously moulded at steam pressures of from 100 to 140 lb. Heavy mouldings with wall sections of ¼ in. or more give better results at lower steam pressures of from 60 to 100 lb.

Properties of the Reacted Plastic

At temperatures between 250° and 350° F., represented by steam pressures up to 180 lb.—mould temperatures equal to steam temperatures are seldom if ever obtained in practical moulding—"Plaskon" hardens or cures with great rapidity. The degree of cure of a heat-reactive plastic may be measured through many properties, including hardness, strength, improvement in electrical properties, and resistance to solvents. In general, hardness and strength come early, while dielectric excellence and solvent resistence are attained relatively more slowly.

"Plaskon" has been made sufficiently reactive to obtain adequate water-resistance in from 20 seconds to 15 minutes, depending on the piece, the moulding conditions, and the class of service expected. Strength and hardness are attained well within these limits, so that water adsorption becomes a measure of cure that is adequate for practical purposes. For ordinary uses there should be no loss in surface finish of the moulded product after 5 minutes immersion in boiling water. It combines infinite colour possibilities, strength and light weight. The base shade is one of neutral translucency, permitting pigmenting to give all colours. Its translucency varies from a light transmission of about 60 per cent. through a 1/16 in. section to complete opacity, as desired. Its specific gravity is 1.43; modulus of rupture 10,000 to 14,000 lb./sq.in.; tensile strength 4,000 to 6,000 lb./sq.in.; compressive strength 25,000 to 30,000 lb/sq.in.; impact strength (Sharpe) 0.7 to 1.2 ft.lb.; dielectric constant (25°C.) 5 to 6; dielectric strength (puncture) 300 to 400 volts per mil.; water adsorption 20° C., ⅛ in. section) 0.07 to 0.66 per cent. in 24 hr.; hardness (Mohr scale) 3.0 to 3.5.

From Week to Week

LORD MELCHETT has recently visited Ayrshire to inspect the various works of Imperial Chemical Industries in the county.

MR. THOMAS B. CORBETT, commercial manager of Metal Industries, Ltd., was married last week at Cambusnethan to Miss Janet G. Craig, daughter of Mr. John Craig, C.B.E., of Colvilles (Ltd.), steel manufacturers.

FOR THE FIRST TIME for many months there has been a decrease reported in the number of the unemployed in the china clay area, due to works in the St. Austell district having been reopened.

MR. N. A. ANFILOGOFF announces that as from January 1 his consulting practice of chemical engineer and petroleum technologist will be removed to Algoa House, 41 Moorfields, Moorgate, London, E.C.2; telephone, Metropolitan 1464/5; telegraphic address, Petrolond, Ave, London.

THE UNIVERSITY OF GOTTINGEN has conferred the degree of Doctor (honoris causa) upon Lord Rutherford, of Cambridge University, who lectured in Berlin on Monday, December 14. Lord Rutherford, F.R.S., is the Cavendish Professor of Experimental Physics at Cambridge, better known to the general public as Sir Ernest Rutherford.

AT A MEETING of the Co-ordinating Committee (representing the Staffordshire Iron and Steel Institute, the Birmingham Metallurgical Society and the Birmingham section of the Institute of Metals) in Birmingham, this week, Mr. R. Jackson (of Alfred Herbert, Ltd., Coventry) read a paper on the subject of "Pulverised Fuel."

IN ORDER TO ASCERTAIN the corrosive influence of the atmosphere on steel and its various alloys, the Iron and Steel Institute of London will co-operate with a Swedish concern in the making of experiments. These will be carried on for two years with the object of obtaining a steel on which air has the least possible effect. A quantity of ironwork for the experiments has arrived from England.

IT IS UNDERSTOOD that negotiations have been completed in the United States for the amalgamation of the Paper Makers' Chemical Corporation and the Hercules Powder Co., both retaining their present titles. The Paper Makers' Chemical Corporation supplies chemicals for the paper industry, but is also a large manufacturer of other industrial chemicals. It operates an English subsidiary, Paper Makers Chemicals, Ltd., of Erith. The Hercules Powder Co. is a producer of cellulose products as well as explosives.

EFFORTS ARE BEING MADE by the Irish Free State Department of Lands and Fisheries to encourage the production of kelp during the winter months. During the heavy weather experienced at this time of the year large quantities of seaweed are thrown up on the West Coast and by experiment it has been found that if this weed is stacked without drying it forms into cakes and produces even better kelp than that obtained from the summer weed. The Department has a market for considerably more kelp than is being produced at the present time and the industry is being developed to its fullest extent around the West and North-West Coasts of the country.

THE EXECUTIVE COMMITTEE of the Federation of British Industries, at their meeting on December 9, passed a resolution to the effect that in view of the urgent need for national economy, they would urge most strongly upon His Majesty's Government that the proposed revaluation as provided under the Rating and Valuation Act, 1925, should be postponed. It is understood that this revaluation would entail a public expenditure og £1,200,000, to which would have to be added the consequential heavy expenses of ratepayers, and in view of the present national situation, the Federation considers that greater national advantage would result from the saving of so large a sum than could accrue through proceeding with a revaluation at the present moment. The Federation would therefore ask that legislation should be introduced postponing the revaluation until the year 1933. Previously many local authorities have requested the Ministry of Health to postpone the valuation on account of the expenditure involved, together with the difficulties of correct adjustment of valuation at the present period; thus the Federation is supporting those local authorities who are endeavouring to avoid increases of local rates due to national legislation.

HOWARDS AND SONS, LTD., chemical manufacturers, of Ilford, will close their works for stocktaking on December 30 and 31.

PROFESSOR THOMAS GRAY, professor of technical chemistry at the Royal Technical College, Glasgow, was featured last week in the "Glasgow Folks" feature of the local *Evening News*.

THE STANTON IRON WORKS have secured, in face of severe competition from foreign firms, a contract for the delivery of cast-iron pipes to a value of approximately £3,800 to the Municipal Gas Works in Copenhagen.

IN CARRYING OUT THE OPERATION of the sinking funds applicable to the Potash Syndicate of Germany seven per cent. bonds, series "A" and "B," for the period ending April 30 next, bonds amounting to £111,890 of series "A" and £55,390 of series "B" have been purchased and cancelled.

DURING THE DISCUSSION of the Committee Stage of the Mines and Minerals Bill in the Irish Free State Senate last week a member stated that in a sample of dry sand taken from the foreshore at Galway, a London assayer had reported that he found that the sample averaged six pounds of metallic tin per ton.

UNDER THE TERMS OF AN ARBITRATION award issued at Essen last evening, the wages of some 300,000 men employed in the so-called North West group of the German metal industries will be reduced by amounts ranging between 8 per cent. and 10 per cent. on January 1 next. As some compensation for the reductions the 52-hour and 57-hour weeks at present worked by many grades are to be reduced to forty-eight hours and fifty-two hours respectively.

RECENT WILLS include:—William Sloan Mills, D.Sc., of Easedale, Little Sutton, near Birkenhead, manager of the Ellesmere Port Branch of Imperial Chemical Industries, Ltd., formerly lecturer in chemistry at Woolwich Polytechnic, left personal estate in England and Northern Ireland £5,268. Professor Percy Groom (66), of the Imperial College of Science and Technology, South Kensington £4,414, net personalty £4,316.

WHY THE CRISIS? is the subject of a newly published book written by Lord Melchett. Like his distinguished father, the present Lord Melchett is interested in ideas, and he is very successful in relating facts of industry and trade to their background of economic progress and human welfare. He stresses throughout his book the natural resentment of manufacturers against bankers and financiers whose technique appears by comparison so far inferior to their own.

THE EXECUTIVE COMMITTEE of the League of Nations Union have passed a resolution urging the Government "in view of the danger to world peace which may result from uncontrolled competition in new types of armament, including material and equipment for chemical or bacteriological warfare," to move the League of Nations to entrust to a permanent organisation the duty of taking cognisance of the preparation, or exploitation of new materials for chemical warfare.

OWING TO THE PROLONGED ILLNESS of Mr. William H. Ross, chairman and managing director of the Distillers Co., Ltd., changes in managerial appointments have been approved by the board of directors. Mr. Ross will continue to occupy the position of chairman of the Board, to which office he was elected in July, 1925, but the post of managing director, which he has occupied for over thirty years, will now be shared by Mr. Thomas Herd. Mr. Herd was formerly joint managing director of James Watson and Co., Ltd., distillers, Dundee, and in 1923 entered the service of the Distillers Co., of which he has been a director since 1925. Other appointments involve changes in the status of Mr. Thomas H. Board and Mr. Henry J. Ross, who will now become assistant managing directors.

Obituary

MR. J. G. WILSON, member of the Council of the National Federation of Paint, Colour and Varnish Manufacturers: at Hull, aged 52.

MR. GERALD KING WALKER, of Willow Green, Edgerton Grove Road, Huddersfield, a director of the firm of John Lee Walker and Sons, dyers, Woodhouse Mills, Huddersfield. Aged 34.

MR. WILLIAM HENRY COCKTON, late chief chemist at Veno Drug Co., Old Trafford. Aged 43.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

355,078. SULHURETTED HYDROGEN; FERROUS SULPHATE AND OTHER SALTS. United Verde Copper Co., Clarkdale, Ariz., U.S.A. (Assignees of O. C. Ralston and C. R. Kuzell, Clarkdale, Ariz., U.S.A.) International Convention date, September 25, 1929.

Copper matte is made reactive to mineral acids by increasing the content of free metallic iron either by adding iron or by reducing the iron oxides present. The reactive matte is treated with sulphuric acid to obtain hydrogen sulphide and ferrous sulphate.

355,092. NITRATES. J. Y. Johnson, London. From I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 13, 1930.

Solution of nitrates are intimately mixed with nitric acid and oxygen in the lower part of a vertical tube, and allowed to rise through the tube which is of such a height, *e.g.*, 6-10 metres, that the nitrite is completely converted into nitrate and the residual gases separated at the top of the tube. Examples are given of the treatment of mixtures of calcium nitrate and calcium nitrite, and also sodium nitrate and sodium nitrite.

355,098. AMMONIUM SULPHATE. Kunstdunger Patent Verwertungs Akt.-Ges., Glarus, Switzerland. International Convention date, November 9, 1929.

A suspension of calcium sulphate in ammonium sulphate solution and a solution of ammonium carbonate are continuously supplied to a reaction vessel containing a large bulk of finished reaction products, and finished reaction products are continuously removed. The calcium carbonate formed is thus caused to deposit on calcium carbonate crystals already formed and is obtained in easily filterable form. The reaction is effected in a series of vessels provided with stirrers.

355,111. AMMONIUM PHOSPHATES AND POTASSIUM CARBONATE. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, November 2, 1929.

A solution of mono- di- or tri-potassium phosphate is saturated with ammonia gas and at the same time sufficient carbon dioxide is added to convert the liberated potash into carbonate. Tri-ammonium phosphate is precipitated, separated from the solution of potassium carbonate, and may be heated to obtain mono- or di-ammonium phosphate.

355,178. AMMONIA OXIDATION. N. Caro, 97 Hohenzollerndamm, Dahlem, Berlin, and A. R. Frank, 138 Kurfurstendamm, Halensee, Berlin. International Convention date, March 3, 1930.

In the oxidation of ammonia, the catalyst is placed between water-cooled metal plates, or bundles of tubes containing boiling water.

355,194. POTASSIUM SALTS. FERTILISERS. Kali-Chemie Akt.-Ges., 10 Reichstagsufer, Berlin. International Convention date, April 9, 1929.

Potassium chloride mixed with sodium chloride, *e.g.*, crude sylvinite is treated with a mineral acid or acid salt to obtain potassium salts and hydrochloric acid. The latter is used for treating crude phosphates to obtain dicalcium phosphate for use as a fertiliser.

355,484. HIGHER ALIPHATIC ALCOHOLS. Deutsche Hydrierwerke Akt.-Ges., 163 Kantstrasse, Charlottenburg, Berlin. International Convention date, August 3, 1929.

Natural solid or liquid waxes are hydrogenated until their iodine number is zero and the products subjected to alkaline saponification and extraction, or distillation. Sperm oil may be hydrogenated with a nickel catalyst and the product saponified with caustic soda, dried, and extracted with trichlorethylene or distilled to obtain cetyl and octadecyl alcohols. The residual soap may be treated with sulphuric acid to recover fatty acids.

355,538. ORGANO-ARSENIC COMPOUNDS. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, September 13, 1929. Addition to 318,491 (see THE CHEMICAL AGE, Vol. xxi, p. 479).

An ester of an hydroxy-acylamino-phenylarsinic acid of the type $AsO_3H_2.Ar.NH.CO.(CH_2)_nOR$ where R represents a carboxylic acid residue is obtained as described in Specification 347,083 (see THE CHEMICAL AGE, Vol. xxv, p. 100) and is then saponified with caustic soda to split off the residue R. Examples are given of the treatment of esters of 4-glycollyl-aminophenyl-arsinic acid and 2-methyl-4-glycollyl-aminophenyl-arsinic acid.

355,573. POLYMERISED STYRENE AND ITS HOMOLOGUES. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, January 28, 1930.

Styrene or its homologues are treated in aqueous emulsion with oxygen or agents supplying it such as benzoyl peroxide or hydrogen peroxide. The emulsifying agent may be soaps, saponins, sulphonic acids, sulphuric esters and their salts, with the addition of higher alcohols, albumenous substances, and other substances which promote emulsification, such as bentonite. Examples are given of the polymerisation of styrene emulsified with oleic acid and aqueous ammonia, or ammonium oleate and aqueous ammonia, by treating with hydrogen peroxide at 60°-70° C. and 30° C. respectively.

355,574. POLYMERISED AROMATIC COMPOUNDS CONTAINING SALT-FORMING GROUPS. F. Hoffmann-La Roche & Co., Akt.-Ges., 184 Grenzacherstrasse, Basle, Switzerland. International Convention date, November 4, 1929.

Substances which arrest blood-coagulation are obtained by introducing salt-forming groups such as $CH_2.COOH$, SO_3H, $CH_2.CH_2.N(C_2H_5)_2$ into the polymerisation products of propenyl-phenols. Examples are given of the preparation of polymerised anethol disulphonic acid, polymerised diethyl-aminoethyl-coniferyl alcohol, and polymerised coniferyl glycollic acid.

355,597. CARBOXYLIC ACIDS. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, November 12, 1929. Addition to 277,670 (see THE CHEMICAL AGE, Vol. xvii, p. 467).

The alkyl group in an anthraquinone derivative containing an alkyl group in 2-position and a heterocyclic ring system in 1 : 9-position, is oxidised by an aromatic nitro compound in the presence of an oxide or hydroxide of an alkaline earth metal. A copper compound may be present as a catalyst. Examples are given of the oxidation of 2-methyl-1 : 9-pyrazol-anthrone with nitrobenzene in the presence of barium hydroxide to obtain pyrazol-anthrone-2-carboxylic acid; 2-methyl-1 : 9-thiazol-anthrone in the presence of a copper catalyst to obtain thiazol-anthrone-2-carboxylic acid; 2-methyl-1 : 9-thiazol-anthrone with nitrobenzene in the presence of calcium hydroxide to obtain 2 : 2¹-thiazol-anthronyl-ethylene, and further in the presence of barium hydroxide to obtain thiazol-anthrone-2-carboxylic acid; 2-methyl-1 : 9-thiophenanthrone carboxylic acid to obtain thiophenanthrone-2-carboxylic acid.

355,657. DYES. A. G. Bloxam, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, April 25, 1930. Addition to 353,032 (see THE CHEMICAL AGE, Vol. xxv, p. 478).

A leuco derivative of an *o*-oxyanthraquinone or α-oxy-amino-anthraquinone sulphonic acid in which a sulpho group is in *o*-position to an α-oxy group, is heated with ammonia or a primary aliphatic or araliphatic amine in the presence of water. Hydroxy groups are replaced by amino or aralkyl-amino groups, and the sulpho group is eliminated. The products may be oxidised. The corresponding anthraquinone may be employed instead of the leuco derivative, the reduction being effected simultaneously. Examples are given of the treatment of sodium 1 : 5-dioxy-4 : 8-diaminoanthraquinone-2 : 6-disulphonate, sodium 1 : 8-dioxy-4 : 5-diaminoan-

thraquinone-2 : 7-disulphonate, sodium 1 : 5-dioxy-4 : 8- diaminoanthraquinone-2 : 6-disulphonate, 1 : 4-dioxyanthraquinone-2-sulphonic acid and others. The products may be suspended in sulphite cellulose lye and dye acetate silk in blue shades.

355,661-2. DYES AND INTERMEDIATES. I. G. Farbenindustrie Akt.-Ges. ,Frankfort-on-Main, Germany. International Convention date, May 18, 1929.

355,661. 4-Halogen-hydroxy-thionaphthenes are obtained from 3-halogen-phenyl-1-thioglycollic acids containing in the 2-position a carboxy, a carboxyamide or a nitrile group, and then oxidised to obtain thioindigo dyes. 3-Halogen-1-thioglycollic acids containing in the 2-position a carboxy or a nitrile group are obtained from the 3-halogen-1-aminobenzenes. 3-Halogen-2-carboxyamido-1-thioglycollic acids are obtained by saponifying the corresponding thioglycollic acids containing a nitrile group in the 2-position. In an example, 3-chlorphenyl-1-thioglycollic-2-carboxylic acid is obtained by diazotising 6-chlor-2-amino-1-benzoic acid, converting into the xanthic ester, saponifying with alkali, and condensing the mercaptan with chloracetic acid. The product is then refluxed with acetic anhydride and anhydrous sodium acetate, and the resulting 4-chlor-acetyloxy-thionaphthene saponified and oxidised.

355,272. CONDENSING SULPHUR. Sulphur and Smelting Corporation, 54 Wall Street, New York. Assignees of E. W. Wescott, P.O. Box 918, Niagara Falls, N.Y., U.S.A. International Convention date, June 5, 1929.

Sulphur vapour enters through tube 24, to a header 14, and passes thence through tubes 12, having helical baffles 22, to a header 16, the whole forming a condenser 10*a*. Water circulates around the tubes and the steam generated passes out through tube 20, having a regulating valve 67 which is adjusted so that the condensed sulphur is at 115°-160° C. when it is freely liquid. The liquid sulphur is run off at 30° C., and

FIG.1.

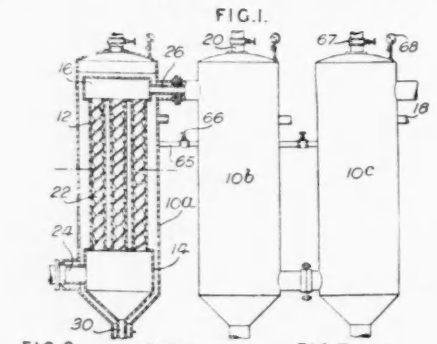
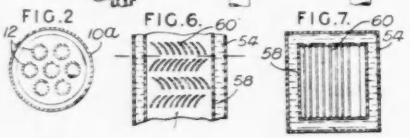


FIG.2 FIG.6. FIG.7.



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gases and vapours pass through a tube 26 to condenser 10*b*, and thence through condenser 10*c*. The three condensers are similar, but are maintained at different temperatures, *e.g.*, at 150° C., and 115° C. respectively, by controlling the steam pressures in the jackets. The cooling water may pass through the condensers in the opposite direction, the water jackets being connected by pipes 65. The baffles 22, in the tubes may be modified or may be omitted altogether, in which case the residual gases are treated to remove any sulphur mist in a chamber 58, having rows of oppositively inclined baffles 60, surrounded by steam jacket 54. If a liquid of high boiling point is used in the condenser jackets, the sulphur may be condensed at the high temperature range at which it is freely liquid, *e.g.*, 240°-250° C.

355,294. SEPARATING LIQUIDS; PURIFYING MINERAL OILS. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, 30 Carel van Bylandtlaan, The Hague. International Convention date, June 3, 1929.

Liquid mixtures such as mineral oils are separated by treating in counter-current with two auxiliary liquids which are immiscible with one another and have different solvent properties for the components of the mixture. One of the auxiliary liquids may be miscible with the oil, or may be a component of it. Lubricating oils may be fractionated by treating with benzine and liquid sulphur dioxide, and middle oils by methyl alcohol and carbon bisulphide. A mixture of mineral oil and naphthenic acids in equal parts may be treated with alcohol and petrol in the proportion of 3 : 1, the alcohol yielding naphthenic acids containing 2 per cent. of oil, and the petrol yielding oil containing 2 per cent. of acids.

FIG.1.

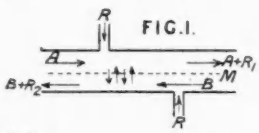
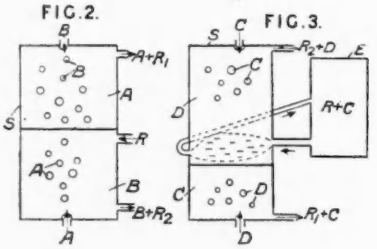


FIG.2. FIG.3.

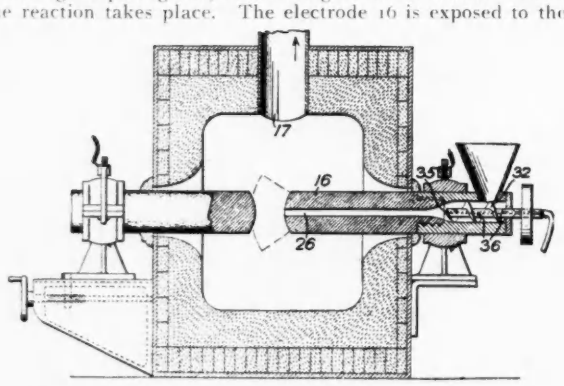


355,294

The oil is passed at R, R into a horizontal conduit divided by the diffusion membrane M, and the auxiliary liquids A, B, of equal density are passed through in opposite directions through the two parts of the conduit. In another form, the oil is introduced at R into a tower S and the liquids A, B at opposite ends, B being the heavier liquid. The auxiliary liquids are drawn off at opposite ends, and the components R_1, R_2 are separated by distillation or freezing. In another form, a mixture of the oil R and one auxiliary liquid C passes from tank E transversely through auxiliary liquids C, D flowing in opposite directions through the tower S. The effluent liquids C, D contain the components R_1, R_2 of the oil, and the liquids C, D, are then recovered and re-circulated. Another modification of this process is described.

355,700. CARBIDES AND BORON SILICIDE. Buffalo Electric Furnace Corporation, 1724 Rand Building, Buffalo, N.Y., U.S.A. International Convention date, June 27, 1929.

The apparatus is for the production of boron silicide, calcium carbide, tungsten and other heavy metal carbides, and silicon carbide, and may be used for the fixation of atmospheric nitrogen by the cyanamide method. The mixed charge is fed through a hopper to a worm conveyor 32, which delivers it through a passage 26, terminating at an electric arc where the reaction takes place. The electrode 16 is exposed to the



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heat of the furnace so that the charge reacts and becomes fluid before it reaches the arc. Gases are drawn off from the furnace through flue 17, and some of the gas may be diverted into the hollow shaft of the conveyor, which is perforated, to allow the gas to mix with the charge.

355,693. DYES AND INTERMEDIATES. Imperial Chemical Industries, Ltd., Millbank, London, H. A. Piggott and E. H. Rodd, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, February 24, 1930.

Heterocyclic nitrogen compounds containing reactive methyl groups or external reactive methylene groups are condensed with equimolecular amounts of compounds of the general formula $X=(CH)_{2n-1}Y$, where X is a substituted imino group and Y an arylamino group, to obtain intermediates for polymethine dyes. The dyes are obtained by using 2 molecular proportions of the heterocyclic nitrogen compounds, or by condensing the intermediates with another molecular proportion of the heterocyclic nitrogen compound or of a cyclic compound containing an intracyclic reactive methylene group, *e.g.*, a pyrazolone, or which reacts tautomerically as though such a group were present, *e.g.*, an indole not substituted in the β-position. These dyes are used for sensitising photographic emulsions to long wave lengths, and examples are given.

355,362. CATALYSTS. British Celanese, Ltd., 22 Hanover Square, London, H. F. Oxley, W. H. Groombridge, and E. B. Thomas, of British Celanese, Spondon, near Derby. Application date, April 16, 1930.

Specification No. 353,467 (see THE CHEMICAL AGE, Vol. XXV, p. 431) describes the production of ketones. Catalysts for this process are obtained by heating a mixture of zinc oxide and alkaline earth oxide to produce a product having hydraulic properties, which is ground, mixed with water, and allowed to set. The oxide mixture may be obtained by precipitation from mixtures of salts and the heating may be to 1,200°-1,800° C. for calcium and zinc oxides, and 500° C. for zinc and magnesium oxides.

355,697 and 355,709. DYES. W. W. Groves, London. From I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application dates, April 26, 1930, and May 23, 1930.

355,697, A 1-amino-4-halogenanthraquinone-2-sulphonic acid is condensed with 2-amino-5 : 6 : 7 : 8-tetrahydro-naphthalene-4-sulphonic acid or a nuclear substitution product in the presence of a copper salt, to obtain acid wool dyes.

355,709, a diazotised amine containing no heterocyclic residue is coupled with an an aroylacetic acid mono-arylide of the formula $R.CO.CH_2.CONHR^1$ where R and R^1 represent aryl residues but R^1 does not contain an azoxy group or a heterocyclic residue, the amine and the arylide being free from groups rendering the dyestuff water-soluble. The dyes are made in substance, on a substratum or on the fibre and give fast yellow to red shades. Several examples are given.

Specifications Accepted with Date of Application

361,837. Carbon black, Manufacture of. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*). June 21, 1930.

361,850. Carrying out reactions in the presence of hydrogen. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*). July 25, 1930.

361,888. Esters of aliphatic acids, Production of. Commercial Solvents Corporation. May 18, 1929.

361,890. Fertilising agent, Manufacturers of—by wet oxidation of coal and the like. M. F. Carroll, and A. Boake, Roberts & Co., Ltd. June 23, 1930.

361,903. Treating materials containing iron in combination with sulphur, Process of. Sulphide Corporation. May 23, 1929.

361,909. Azo-dyestuffs on the fibre, Manufacture of. Soc. of Chemical Industry in Basle. July 19, 1929.

361,910. Condensation products of high molecular weight, Manufacture of. I. G. Fabenindustrie Akt.-Ges. August 14, 1929.

361,917. Vulcanization accelerators. Imperial Chemical Industries, Ltd., H. M. Bunbury, J. S. H. Davies, and W. J. S. Naunton. August 22, 1930.

361,935. Ammonium sulphate crystals, Preparation of. H. Wade. (*H. Koppers Akt.-Ges.*). June 21, 1930.

361,944. Hydrocarbons of low boiling point, Manufacture of J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*). July 25, 1930.

361,957. Magnesium from magnesium oxide, Production of. (*Hirsch Kupfer und Messingwerke Akt.-Ges.*). August 26, 1929.

361,971. Rubber vulcanization accelerators. Firestone Tyre and Rubber Co., Ltd. January 29, 1930.

362,027. Intermediates for dyes, Manufacture of. Imperial Chemical Industries, Ltd. (*E. I. Du Pont de Nemours and Co.*). September 12, 1930.

362,068. Chloride of lime, Production of. Soc. Elettrica ed Elettrochimica del Caffaro, A. Carughi, and C. Paoloni. November 25, 1929. Addition to 317,716.

362,069. Manure mixtures. Kali-Forschungs-Anstalt Ges. October 23, 1929.

362,127. Separating metals and metalliferous minerals from ore-containing pulp, Process and apparatus for. K. G. Smit. November 12, 1930.

362,162. Potassium nitrate, Production of. Kali-Forschungs-Anstalt Ges., O. Kaseltiz, and B. Uebler. December 5, 1930.

362,172. Rubber, Preservation of. Goodyear Tire and Rubber Co. February 17, 1930.

362,204. Amyl alcohol, Manufacture of a substitute for. Usines de Melle. January 7, 1930.

362,215. Esters from olefines, Production of. Standard Oil Development Co. January 21, 1930.

362,267. Blue and blue-violet sulphurized dyestuffs, Preparation of. Chemische Fabrik Vorm. Sandoz. March 8, 1930.

362,297. Zinc white, Manufacture of. V. Szidon. December 18, 1930.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Carbide and Carbon Chemicals Corporation. Prevention of solution loss from liquid systems. 34107. December 9. (United States, January 6.)

Carpmael, A. (*I. G. Fabenindustrie Akt.-Ges.*). Manufacture of sulphonic acids of the anthraquinone series. 34064. December 8.

—— Manufacture of anthraquinone condensation products. 34182, 34183. December 9.

Coley, H. E. Extraction of metals from ores. 34468. December 12.

Du Pont de Nemours & Co., E. I. Plasticizers for cellulose derivatives. 33948. December 7. (United States, December 6, 1930.)

Easton, R. W. Producing activated carbon from powdered coal, etc. 34254. December 10.

Effront, I. A. Liquefaction and saccharification of amylaceous materials in brewing. 34395. December 11. (France, January 29.)

Ges. Für Kohlentecknik. Production of guanidine thiocyanate. 33928. December 7. (Germany, December 12, 1930.)

Groves, W. W. (*I. G. Fabenindustrie Akt.-Ges.*). Manufacture of 1-hydroxy-anthracene-carboxylic acid. 34086. December 8.

Haeck, A. Manufacture of mixtures for carburation, etc., from oils. 34516. December 12.

—— Process for purifying oils, etc. 34517. December 12.

Johnson, J. Y. (*I. G. Farbenindustrie Akt.-Ges.*) Carrying on catalytic reactions. 33875. December 7.

—— Johnson, J. Y. Manufacture of abrasives. 33876. December 7.

—— Johnson, J. Y. Manufacture of vat dyestuffs containing halogen. 33877. December 7.

—— Johnson, J. Y. Manufacture of vat dyestuffs. 34141. December 9.

—— Mond, A. L. Imparting globular shape to salts. 34149. December 9.

—— Mond, A. L. Production of azo dyestuffs. 34268. December 10.

—— Johnson, J. Y. Dispersing agents, etc. 34281. December 10. (September 9, 1930.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of alkyl halides. 33907. December 7. (April 29.)

—— Photographic material. 33921. December 7. (Germany, December 6, 1930.)

—— Manufacture of tertiary nitriles. 34306. December 10. (Germany, Dec. 10, 1930.)

—— Manufacture of methane derivatives. 34410. December 11. (Germany, December 12, 1930.))

—— Killing flies, etc. 34526. December 12. (Germany 13, 1930.)

Imperial Chemical Industries, Ltd. Smith, W., and Thomson, R. F. Dyestuff intermediates. 34199. December 9.

Morgan, G. T., and Pratt, D. D. Production or organic amines. 34362. December 11.

Society of Chemical Industry in Basle. Production of white and coloured reserves under aniline black. 33922. December 7. (Switzerland, January 14.)

—— Manufacture of cellulose derivatives containing nitrogen. 34176. December 9. (Switzerland, December 10, 1930.)

Spence & Sons, Ltd., P. Spence, H Treatment of aluminous materials. 34089. December 9.

Stockholms Superfosfat Fabriks Aktiebolag. Production of solid di-ammonium phosphate. 34057. December 8. (Sweden, December 9, 1930.)

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID, ACETIC, 40% TECH.—£18 15s. per ton d/d address U.K. in casks.

ACID CHROMIC.—11d. per lb., less 2½% d/d U.K.

ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° TW.—Spot, £20 to £25 per ton makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.

AMMONIUM BICHROMATE.—8d. per lb., d/d U.K.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER, 35/37%.—Spot, £7 19s. per ton d/d station in casks, special terms for contracts.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 per ton. (Packed in 1 cwt. bags, carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.)

CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d station in drums.

CHROMIUM OXIDE.—9½d. to 10d. per lb. according to quantity d/d U.K.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 per ton d/d U.K.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 8d. to 2s. 3d. per gall.; pyridinised industrial, 1s. 10d. to 2s. 5d. per gall.; mineralised, 2s. 9d. to 3s. 3d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4¾d. per lb. net d/d U.K., discount according to quantity; ground 5½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb. ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—5½d. per lb. d/d U.K.

SALAMMONIAC.—First lmp, spot, £40 17s. 6d. per ton d/d address in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE, UNGROUND.—Spot, £3 10s. per ton d/d station in bulk.

SODA ASH, 58%.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

SODA CAUSTIC, SOLID, 76/77° E.—Spot, £14 10s. per ton, d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.

SODIUM BICHROMATE CRYSTALS, CAKE AND POWDER.—3¾d. per lb. net d/d U.K., discount according to quantity. Anhydrous 4¾d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM CHROMATE.—3¾d. per lb. d/d U.K.

SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.

SODIUM PHOSPHATE.—£15 per ton, f.o.r. London, casks free.

SODIUM SILICATE., 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d.

SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton, d/d in drums. Crystals—Spot, £8 5s. per ton, d/d in casks.

SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton; d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—5½d. to 6½d. per lb. Crude 60's 1s. 4d. to 1s. 5d. per gall.

ACID CRESYLIC 99/100.—1s. 8d. to 1s. 9d. per gall. B.P., 2s. 6d. to 3s. per gall. Refined, 2s. to 2s. 2d. per gall. Pale, 98%, 1s. 7d. to 1s. 8d. Dark, 1s. 4d. to 1s. 4½d.

BENZOLE.—Prices at works: Crude, 7d. to 7½d. per gall.; Standard Motor, 1s. 2d. to 1s. 3d. per gall. 90%.—1s. 3d. to 1s. 4d. per gall. Pure, 1s. 6d. to 1s. 7d. per gall.

TOLUOLE.—90%, 2s. 4d. per gall. Pure, 2s. 6d. per gall.

XYLOL.—2s. per gall. Pure, 2s. 3d. per gall.

CREOSOTE.—Standard specification, for export, 4¾d. to 5d. net per gall. f.o.b.; for Home, 3¾d. per gall. d/d.

NAPHTHA.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 5d. to 1s. 6d. per gall. Solvent, 90/190, 11d. to 1s. 2d. per gall.

NAPHTHALENE.—Purified Crystals, £11 10s. per ton, in bags.

PITCH.—Medium soft, 70s. per ton, in bulk at makers' works.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 4s. to 4s. 6d. per gall. 90/180, 2s. to 2s. 6d. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID GAMMA.—Spot, 3s. 3d. per lb. 100% d/d buyer's works.

ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works.

ACID NEVILLE AND WINTHER.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.

ACID SULPHANILIC.—Spot, 8¼d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.

o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.

p-CRESOL 34.5° C.—1s. 9d. per lb., in ton lots.

DICHLORANILINE.—2s. 5d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.

DINITROBENZENE.—7¾d. per lb.

DINITROTOLUENE.—48/50° C., 7d. per lb.; 66/68° C., 7¾d.-8d. per lb.

DIPHENYLAMINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

a-NAPHTHOL.—Spot, 1s. 9d. per lb. d/d buyer's works.

B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—Spot, 10½d. per lb. d/d buyer's works.

B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 6½d. per lb.; 5-cwt. lots, drums extra, d/d buyers' works.

NITRONAPHTHALENE.—8¾d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 6d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 6d. per lb. d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 3d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—£7 5s. to £7 10s. per ton. Grey, £12 to £12 5s. per ton. Liquor, 8d. to 9d. per gall.

ACETIC ACID, TECHNICAL, 40%.—£16 15s. per ton.

ACETONE.—£63 to £65 per ton.

AMYL ACETATE, TECHNICAL.—80s. to 90s. per cwt.

CHARCOAL.—£6 to £10 per ton, according to grade and locality.

IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gall.

METHYL ACETONE, 40/50%.—£52 per ton.

RED LIQUOR.—16° Tw., 8½d. to 10d. per gall.

WOOD CREOSOTE.—1s. to 2s. 6d. per gall., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gall. Solvent, 3s. 9d. per gall.

WOOD TAR.—£2 to £6 per ton.

BROWN SUGAR OF LEAD.—£32 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 1d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 5d. to 1s. 7d. per lb.

BARYTES.—£7 to £8 10s. per ton, according to quality.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.

CARBON, BLACK.—4d. to 5d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—2s. 6d. per lb.

INDIARUBBER SUBSTITUTES, WHITE.—4d. to 5½d. per lb.; Dark, 4d. to 4½d. per lb.

LAMP BLACK.—£46 to £50 per ton.

LITHOPONE, 30%.—£20 to £22 per ton.

SULPHUR.—£12 5s. to £15 15s. per ton.

MINERAL RUBBER "RUPRON."—£18 10s.

PIPERIDINE RUBBER ACCELERATORS.—P.P.D., 10s. 6d. to 11s. 6d. per lb.; Z.P.D., 7s. to 7s. 6d. per lb.; L.P.D., 6s. 6d. to 7s. per lb.; P.T.D., 9s. 8d. to 10s. 4d. per lb.; C.P.D., 8s. 3d. to 8s. 10d. per lb.; S.P.D., 8s. 1d. to 8s. 7d. per lb.; Suparac, Standard, 7s. per lb.; Suparac, Z, 3s. 6d. per lb.

SULPHUR CHLORIDE.—4d. to 7d. per lb., according to quality.

SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.

SULPHUR PRECIP. COMMERCIAL.—£50 to £55 per ton.

VERMILLION, PALE OR DEEP.—6s. 11d. to 7s. 1d. per lb.

ZINC SULPHUR.—10d. to 1s. 1d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, December 15, 1931.

THE market for chemicals has been generally active with prices moving upward.

ACETONE.—Firm at £65/68 per ton. The active demand continues.
ACID, ACETIC.—Continues very firm at £37 5s. to £39 5s. for Technical 80% and £38 5s. to £40 5s. for Pure 80%.
ACID, CITRIC.—Is firm at 1s. 1d. per lb., less 5%.
ACID, FORMIC.—Is very firm at about £50 10s. per ton.
ACID, OXALIC.—Is in good demand at £50 per ton in casks.
ALUMINA SULPHATE.—About £8 10s. to £9 10s. per ton.
ARSENIC.—There is a brisk demand with Continental material firm at about £24 per ton c.i.f. main U.K. Ports, and Cornish for forward delivery at about £28 per ton.
BARIUM CHLORIDE.—Continues firm at about £11 per ton.
CREAM OF TARTAR.—Has advanced and is now 97s. 6d. to 100s. per cwt., less 2½%.
FORMALDEHYDE.—Is firm at about £30 per ton.
LEAD ACETATE.—White at about £41/42 per ton with Brown £1 per ton less.
LITHOPONE.—Steady at about £22 per ton.
POTASSIUM BICHROMATE.—4⅝d. per lb., nett, prompt delivery only.
POTASSIUM CHLORATE.—Continues in fair demand at about £32/34 per ton.
POTASSUM PERMANGANATE.—Needle Crystals B.P., 8½d. to 8¾d. per lb.
POTASSIUM PRUSSIATE.—Is very firm at about 8½d. per lb.
SODIUM ACETATE.—Is in very good demand and firm at about £23 per ton.
SODIUM BICHROMATE.—3¾d. per lb. nett, prompt delivery only.
SODIUM CHLORATE.—The demand is increasing at about £30 per ton.
SODIUM NITRATE.—Firm at about £22 to £22 10s. per ton with a good steady demand.
SODIUM PRUSSIATE.—5d. to 5½d. per lb., with a good demand.
SODIUM SULPHIDE.—Is unchanged but firm.
ZINC SULPHATE.—About £12 per ton.

Coal Tar Products

THE market for coal tar products remains quiet, and prices are unchanged from last week.

MOTOR BENZOL.—Quoted at about 1s. 4½d. to 1s. 5½d. per gallon f.o.r.
SOLVENT NAPHTHA.—Remains at about 1s. 1½d. to 1s. 2d. per gallon f.o.r.
HEAVY NAPHTHA.—Unchanged at about 11d. to 1s. 0½d. per gallon f.o.r.
CREOSOTE OIL.—Remains at about 3d. to 3½d. per gallon f.o.r. in the North, and at about 4d. to 4½d. per gallon in London.
CRESYLIC ACID.—Obtainable at about 1s. 6d. per gallon f.o.r. for the 98/100% quality, and at about 1s. 4d. per gallon for the Dark quality 95/97%.
NAPHTHALENES.—Unchanged at about £2 5s. to £2 10s. per ton for the firelighter quality, at about £2 15s. to £3 per ton for the 74/76 quality, and at about £4 per ton for the 76/78 quality.
PITCH.—Remains at about 65s. to 67s. 6d. per ton, f.o.b. East Coast port.

THE following additional market conditions are reported:—

CARBOLIC ACID.—Is a steady market. Prices are unchanged, 5½d. to 6¼d. per lb. according to quantity.
CRESYLIC ACID.—No change. Pale 97/99%, 1s. 7d. to 1s. 8d. per gallon. 99/100%, 1s. 10d. to 2s., with better grades 2s. 2d. to 2s. 6d.
BRITISH LACTIC ACID (BOWMANS).—Pale quality, 50 per cent. by weight, £32 per ton; 50 per cent. by volume, £27 per ton. Dark quality, 50 per cent. by weight, £26 10s. per ton; 50 per cent. by volume, £22 10s. per ton.
METHYL SALICYLATE.—A fair volume of business is being done; prices are unchanged at 1s. 4½d. to 1s. 6½d. per lb.
SALICYLATES.—Most consumers took the opportunity of booking well ahead when we went off the gold standard, and buyers are, therefore, pretty fully booked for their requirements. Prices are unchanged.

Latest Oil Prices

LONDON, December 16.—LINSEED OIL was steady. Spot, ex mill, £16 10s.; December, £14; January-April, £14 15s.; May-August, £16 10s.; September-December, £17 10s. per ton, naked. RAPE OIL was inactive. Crude, extracted, £30 10s.; technical, refined, £32 10s. per ton, naked, ex wharf. COTTON OIL was slow. Egyptian, crude, £19 10s.; refined, common edible, £23 10s.; and deodorized, £25 10s. per ton, naked, ex mill. TURPENTINE was quiet. American, spot, 51s. 6d.; January-April, 52s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot and December closed at £14 10s.; January-April at £14 15s.; and May-August at £16 7s. 6d. per ton, naked. COTTON OIL.—Egyptian crude, spot, £18 10s.; edible refined, spot, £21; technical, spot, £21; deodorised, £23 per ton, naked. PALM KERNEL OIL.—Crude, f.m.o., spot, £23 10s. per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £27 10s.; deodorised, £31 10s. per ton. RAPE OIL.—Crushed-extracted, spot, £29; refined, £31 per ton. SOYA OIL.—Crushed-extracted, spot, £20; deodorised, £23 10s. per ton. COD OIL.—15s. 6d. per cwt. CASTOR OIL.—Pharmacy, spot, 46s. 6d.; firsts, 41s. 6d; seconds, 39s. 6d. per cwt.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—*Export.*—The market continues quiet, and the price remains unchanged at £5 5s. per ton f.o.b. U.K. ports in single bags. *Home.*—The price remains unchanged, and as usual during this season of the year, few sales are made.

IMPORTED NITRATE OF SODA.—During the month of November imports of this product amounted to 27,416 tons. Imports during the last few months have been exceedingly high, and it is anticipated that stocks in the country must now amount to a year's requirements. A good deal of material may be stored at ports where it is available for re-export. The prices remain unchanged.

BRITISH NITRATE OF SODA.—The prices remain unchanged.

NITRO-CHALK.—It is understood that merchants and farmers continue to book their forward requirements at the price of £7 5s. per ton, which has been in operation now for several months.

South Wales By-Products

WITH the Christmas holidays only a week away by-product activities in South Wales are slower than usual. The pitch demand has shortened and it is not likely that there will be any real improvement until the New Year. There is no change in values. Road tar has only a moderate call, with prices unchanged round about 13s. per 40-gallon barrel. Refined tars are also on the slow side, with quotations for gasworks and coke-oven tar unchanged. Naphthas have a small, sporadic call, with solvent and naphtha quotations unchanged. Patent fuel and coke exports are unsatisfactory. Patent fuel prices, for export, are: 19s. to 19s. 6d., ex-ship, Cardiff; 18s. to 18s. 6d., ex-ship, Swansea. Coke prices are: Best foundry, 32s. 6d. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace,, 16s. to 17s. 6d.

Scottish Coal Tar Products

SOME activity is noticeable for refined tar for roadmaking, but distillers continue unwilling to commit themselves for forward delivery. Other products are mainly quiet.

CRESYLIC ACID.—Stocks are high and prices are somewhat irregular. Pale, 99/100 per cent., 1s. 4d. to 1s. 5d. per gallon; pale, 97/99 per cent., 1s. 2d. to 1s. 3d. per gallon; dark, 97/99 per cent., 1s. 1d. to 1s. 2d. per gallon; all f.o.r. makers' works. High Boiling Acid is steady at 2s. 6d. to 3s. per gallon.

CARBOLIC SIXTIES.—Prompt production is easily disposed of and value remains at 1s. 6½d. to 1s. 7½d. per gallon f.o.r. makers' works.

CREOSOTE OIL.—This product is attracting more attention although prices remain unchanged. Specification oils, 2½d. to 3d. per gallon; washed oil, 3½d. to 3¾d. per gallon; gas works ordinary, 3½d. to 3¾d. per gallon; all ex makers' works in bulk.

COAL TAR PITCH.—Production is low and export value is therefore nominal at 57s. 6d. to 62s. 6d. per ton f.o.b. Glasgow. Home price is 60s. per ton ex works in bulk.

BLAST FURNACE PITCH.—A steady demand is maintained at controlled prices, viz., 40s. per ton f.o.r. works, and 45s. per ton f.a.s. Glasgow for export.

REFINED COAL TAR.—The forward position remains firm. Value is steady at 4d. per gallon f.o.r. naked.

BLAST FURNACE TAR.—Nominal at 2¾d. f.o.r.

WATER WHITE PRODUCTS.—Inquiries are scarce and prices are easy. Motor Benzole, 1s. 3½d. to 1s. 4½d. per gallon; 90/160 Solvent, 1s. 2½d. to 1s. 3½d. per gallon; and 90/190 Heavy Solvent, 1s. 0½d. to 1s. 1½d. per gallon; all in bulk ex works.

Increase in United States Coumarin Imports

IMPORTS of coumarin entered for consumption in the United States during the first 10 months of 1931 of 8,478 lbs. represent a 73 per cent. increase over the same period of 1930, or 4,886 lbs. Of the 1931 incoming shipments, 5,163 lbs. were from France and 3,315 from Germany. Imports for 1929 and 1930 were 7,756 lbs. and 6,327 lbs. respectively.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Chas. Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, December 16, 1931.

THE greater portion of business in the Scottish heavy chemical market at the present time, is for contract requirements, covering the ensuing year. Export inquiries are still numerous.

ACETONE.—B.G.S.—In good demand quoted £65 to £68 per ton ex wharf, according to quantity.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £48 to £59 per ton; pure, 80%, £38 5s. per ton; technical, 80%, £37 5s. delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £25 per ton; crystals, £26 per ton; B.P. crystals, £34 per ton; B.P. powder, £35 per ton, in 1-cwt. bags, delivered Great Britain free in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at £42 to £43 per ton, ex store.

ACID, SULPHURIC.—£3 7s. 6d. per ton, ex works, for 144° quality. £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 1s. to 1s. 0½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted round about £8 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted at £9 10s. per ton, c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station.

ANTIMONY OXIDE.—Spot material obtainable at round about £33 per ton, ex wharf.

ARSENIC, WHITE POWDERED.—Quoted £25 10s. per ton, ex wharf. Spot material still on offer at £26 per ton, ex store.

BARIUM CHLORIDE.—Price about £10 10s. to £11 10s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots.

CALCIUM CHLORIDE.—British manufacturers' price, £5 5s. to £5 15s. per ton, according to quantity and point of delivery.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £29 per ton, ex store.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station.

LEAD, RED.—Price now £30 per ton, delivered buyer's works.

LEAD, WHITE.—Quoted £40 per ton, carriage paid.

LEAD ACETATE.—White crystals quoted round about £35 to £36 per ton c.i.f. U.K. ports. Brown on offer at about £1 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £9 10s. per ton, ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p., quoted 2s. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4¼d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—96% to 98%. In fair demand. Spot material on offer, £28 per ton ex store.

POTASSIUM CHLORATE.—99¾/100% Powder.—Quoted £34 per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 7d. per lb. ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 8d. per lb., ex store.

SODA, CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77%, £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums; all carriage paid buyer's station, minimum four-toun lots; for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3½d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, four-ton lots.

SODIUM NITRATE.—Price not yet fixed.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyer's works on contract, minimum four-ton lots. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £14 per ton; roll, £12 10s. per ton; rock, £11 5s. per ton; ground American, £10 10s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £18 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Low Temperature Carbonisation

A Large Permanent Market Assured for Smokeless Fuel

AT the fourteenth annual general meeting of Low Temperature Carbonisation, Ltd., held in London on Tuesday, December 15, Colonel W. A. Bristow, the chairman and managing director, who presided, referred to the enormous increase in the interest in and market for low-temperature by-products which has come about since 1927. Four years ago, he said, the cry "Oil from British coal" was audible to a very few people, but the last twelve months has seen it swell into a great national question. The Government now realised its importance to the nation, and the exemption from duty which we enjoy in respect of all the motor spirit we produce is a tangible advantage designed by the Government to encourage the industry. The recent Royal Commission on the Coal Industry, for instance, referred to the benefits and prospects of low-temperature carbonisation. If processes of low-temperature carbonisation were perfected, their Report stated, great national advantages would ensue, particularly through the production of a smokeless fuel for domestic and industrial use and the provision of large supplies of mineral oil from the country's own resources. The State should therefore give financial support to the further experiments on a commercial scale which are necessary.

The Company's works at Barugh have been in operation for 4½ years and at Askern for 2½ years. The output is being steadily increased, and during the past twelve months the process has attained record figures for regularity and efficiency, while the cost of operation has been brought down to the lowest figure yet reached. In addition, the quality of the "Coalite" and coal oils has steadily improved. The Company has already distilled nearly half a million tons of coal, yielding over 300,000 tons of "Coalite" and more than 7,000,000 gallons of "Coalite" crude oil and spirit. These figures, however, do not include the output of the works at Greenwich operated by the South Metropolitan Gas Co. The plant at Askern has been established at a colliery, thus eliminating the cost of transport of the coal from the pit to the retorts. The plant at Greenwich, owned and operated by the South Metropolitan Gas Co., on the other hand, is in a magnificent position for the distribution of "Metro-Coalite" (which is the new registered trade mark of their product) to the large and densely populated district in their area.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, December 16, 1931.

In the aggregate a moderate business in chemicals for the time of the year is being put through on the Manchester chemical market, with a fair inquiry in circulation with regard to contract commitments. There has been little further expansion in the call for textile chemicals, but the movement of these into consumption continues on a better scale than it was three months ago. Of the general strength of the market there can be no doubt whatever. In several lines further advances have to be recorded during the past week and it is considered unlikely that the upward movement has yet run its course.

Heavy Chemicals

A quiet trade is passing in sulphide of sodium, values of which keep up at the higher levels of £9 5s. per ton for the commercial quality and £11 10s. per ton for the 60-62 per cent. concentrated solid material. There is a fair demand about for caustic soda and prices are firm at from £12 15s. to £14 per ton, in contracts, and according to grade. Salt-cake meets with a moderate inquiry, with current offers at up to £3 per ton. Bicarbonate of soda is in quietly steady request, with values held at about £10 10s. per ton. Phosphate of soda is steady at round £13 per ton for the dibasic material, but the demand for this is still on a rather restricted scale. Chlorate of soda is firm at about £30 per ton, but there is no big weight of business moving in this section. Bichromate of soda is now being quoted at up to 4d. per lb. for spot parcels. Hyposulphite of soda is in moderate demand, with the photographic quality ranging from about £15 to £15 10s. per ton and the commercial at £9 5s. Prussiate of soda maintains a firm front at from 5d. to 5½d. per lb., according to quantity, a quiet trade being reported. With regard to alkali, this is being called for in regular quantities and values are well maintained at round £6 per ton.

The potash products are all very firm, with a definitely rising tendency. Permanganate is selling in moderate quantities, with current offers of the B.P. material at from 6½d. to 6¾d. per lb., and of the commercial at about 6¼d. Caustic potash is steady at from about £38 per ton, with a fair inquiry reported. Carbonate of potash is dearer at round £31 per ton, with some traders holding out for higher rates. The demand for chlorate of potash this week has been of moderate extent at up to £35 per ton. Yellow prussiate of potash keeps up very well at about 8½d. per lb. With regard to bichromate of potash, this meets with a fair inquiry at from 5¼d. to 5½d. per lb.

Not a great deal of business has been reported during the past few days in the case of sulphate of copper which, however, appears to be rather stronger in tendency at from £18 per ton, f.o.b. Arsenic is steady, with the white powdered, Cornish makes, more or less nominal at £26 10s. per ton at the mines, and imported material at about £24 10s. per ton, ex store. The lead compounds are firm at from £29 to £30 per ton for the nitrate, and £44 and £43 per ton, respectively, for the white and brown acetates. There is only a quiet demand about for the acetates of lime, to-day's values of which are at about £8 per ton for the brown quality and round £11 for the grey.

Acids and Tar Products

A moderate inquiry has been reported for oxalic acid, which is a very strong section at about £2 10s. per cwt., ex store. Tartaric acid is in quiet demand at 1s. 0¾d. per lb., with citric acid in similar position at 1s. 1½d. Acetic acid continues to be on offer here at £39 5s. per ton for the 80 per cent. commercial quality and £52 for the technical glacial.

Among the by-products, pitch is not very active at the moment but quotations are steady at from 60s. to 62s. 6d. per ton, f.o.b. Creosote oil is moving in moderate quantities and prices keep up at 3¾d. to 4¾d. per gallon, naked, according to grade. Carbolic acid is firm at about 1s. 8d. per gallon, naked, for the crude 60's material, and 6d. to 6½d. per lb., f.o.b. for crystals. Solvent naphtha is about maintained at round 1s. 3¾d. per gallon, naked.

Company News

Imperial Smelting Corporation, Ltd.—It was announced at the annual meeting on December 10 that the interim preference dividend would be paid on January 1.

Boots Pure Drug Co., Ltd.—A dividend of 6 per cent., less tax, on the ordinary shares for the quarter, is announced, payable on January 1.

Veno Drug Co. (1925), Ltd.—The directors announce that, as a result of the improvement in the trading position up to the end of November, the company is able to resume the payments of dividends on the preference and preferred ordinary shares. The warrants for the half-yearly dividends due on July 31 last on both classes of shares will be posted to-day, December 19.

International Nickel Co. of Canada, Ltd.—The directors have declared a dividend at the rate of 7 per cent. per annum on the preferred stock, payable February 1, to holders of record January 2. The dividend will be payable by Morgan, Grenfell and Co., in sterling at the cable rate of exchange obtaining in London at the opening of business on February 1.

Sulphide Corporation.—The operations for the year ended June 30, 1931, resulted in a net loss of £67,669 as against a profit of £72,593 last year. This adverse balance is carried to "accumulated profits account,' and reduces credit on that account to £29,428. The annual meeting will be held at Winchester House, London, E.C., on December 22, at 12 noon.

Zinc Corporation, Ltd.—The fixed cumulative dividend on the preference shares for the half-year ended December 31, the directors announce, will be paid on January 4 in English currency to shareholders on both the London and Melbourne registers. Tax will be deducted at the rate of 4s. 3d. in the £. The Corporation's profits, it is stated, do not permit the payment of an interim dividend on the ordinary shares.

Bituminous Compositions.—For the year ended September 30 last the report states that the balance of profit available for distribution (including £1,687 brought forward), amounts to £4,451. An interim dividend at the rate of 7 per cent. per annum, less tax, has already been paid on the ordinary shares, and the directors recommend a final dividend at the same rate for the six months to September 30, making 7 per cent., and that the balance of profit remaining be carried forward.

United Indigo and Chemical Co., Ltd.—At a meeting of the directors held on November 27 it was decided to pay on December 31 an interim dividend of 5 per cent. per annum for the six months ending December 31, 1931, on the participating cumulative preference shares, subject to income tax at 5s. 6d. in the £, and that the preference transfer books of the company be closed from December 24 to 31, 1931, inclusive.

Chemical and Wood Industries, Ltd.—The profit and loss account for the year ended August 31, 1931, shows a profit of £2,601. The amount brought forward was £9,486. From this £2,119 was written off under capital reorganisation scheme. Accordingly the amount now carried forward is £9,967. The subsidiary company, it is stated, has incurred a loss for the year ended August 31, 1931, of £7,246. The annual meeting wil be held at Winchester House, London, E.C.2., on December 21, at 12 noon.

New Fellowship at Mellon Institute

Dr. Edward R. Weidlein, Director of Mellon Institute of Industrial Research, Pittsburgh, Pa., has announced that the Macbeth-Evans Glass Co., Charleroi, Pa., has established in that institution a Fellowship in illuminating glassware. According to Dr. Weidlein, the scientific investigations that will be conducted by this Fellowship will be essentially a continuation along original lines but entirely independent of the technologic research that is now carried on in the Macbeth laboratories. Dr. Rob Roy McGregor, a specialist in physical chemistry, has been appointed to the incumbency of the Fellowship. Dr. McGregor received his professional training at McMaster University and at the University of Illinois and has been a member of Mellon Institute's research staff since 1927.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

STANSFIELD, MR. J., 17 Woodlands Street, Cheetham Hill, Manchester, chemical merchant. (C.C., 19/12/31.) £11 2s. 9d. November 11.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

COLORANE, LTD., London, W.C., chemical process manufacturers. (M., 19/12/31.) Registered December 5, series of £32,500 (not ex.) debentures, present issue £10; general charge.

London Gazette, &c.

Companies Winding Up Voluntarily

CORNWALL ARSENIC CO., LTD. (C.W.U.V., 19/12/31.) By special resolution, December 1, 1931. Mr. William Tredinnick Slee appointed liquidator.

TARFROID, LTD. (C.W.U.V., 19/12/31.) Creditors' claims to Thos. Froude, 34 Victoria Street, London, by January 1.

Companies Winding Up

BRITISH ACETATE SILK CORPORATION, LTD. (C.W.U., 19/12/31.) First meeting December 22 at Kingsway Hall, London, W.C.,; creditors, 11.15 a.m., contributories 12 noon.

ALLIED CEMENT MANUFACTURERS, LTD. Grand Buildings, Northumberland Avenue, London, W.C. (C.W.U., 19/12/31.) Winding-up order, December 7.

Partnership Dissolved

MARSH BROOKS AND CO. (JAMES MARSH, GEORGE MARSH and WILLIAM BROOKS), manufacturing chemists, 170 Bridgeman Street, Bolton, by mutual consent, January 14, 1931. Debts received and paid by James Marsh.

New Companies Registered

VIALIT COMPANY, LTD., 61 St. Mary Axe, E.C.3.—Registered December 9. Nominal capital £25,000 in £1 shares (10,000, 8 per cent. non-cumulative preference and 15,000 ordinary). Manufacturers of and dealers in emulsions or solutions of tar and/or bitumen and other materials for road surfacing purposes in accordance with the process known as the "Vialit" process carried on by the Amber Size and Chemical Co., Ltd., at Wolverhampton and Southampton, and elsewhere, and the goodwill, trade marks and certain freehold and other property in connection therewith. Directors: C. G. Fox, S. Stockell, C. M. Fox.

E. C. BURGOYNE, LTD., 5 and 6 Clements Inn, Strand, W.C.2.—Registered December 11. Nominal capital £3,500 in £1 shares. Manufacturers, producers, importers and exporters of and wholesale and retail dealers in cellulose, cellulose paints, enamels, lacquers, thinners, paints, pigments, etc. Directors: L. Strangman, H. N. Holder, J. E. D. Holder, E. C. Burgoyne, W. A. Woodhouse.

TARFROID (1931), LTD. Registered as a public company on December 10. Nominal capital £100 in 1s. shares. To acquire the undertaking and assets of Tarfroid, Ltd. (incorporated in November, 1927) including among such assets the trade marks "Tarfroid" numbered 467,428 and 471,358, to manufacture and deal in tar, pitch, bitumen, casein, soap, soda, resin, naphtha and all kinds of oils, oleaginous and saponaceous substances and substitutes therefor; to import, export and deal in coal, coke and all residuals and by-products obtained from coal and coke. Directors: D. B. W. Markham, 14 Alexandra Court, London, W.9; J. O. Barnes, W. H. W. Lacey, N. F. Foster.

Chemical Trade Inquiries

These inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country) except where otherwise stated.

SOUTH AFRICA.—A firm of manufacturers' representatives in Cape Town, who cover the Cape themselves and have sub-agents in Johannesburg, East London and Durban, desire to secure the commission or consignment agency of a United Kingdom manufacturer or merchant for glass bottles and jars for the use of manufacturing chemists. (Ref. No. 690.)

FINLAND.—A well-established firm of agents in Helsingfors desire to obtain the representation for Finland of a United Kingdom manufacturer of sulphate of alumina. (Ref. No. 695.)

FRANCE.—An agent established at Pessac (Gironde) wishes to obtain the representation of United Kingdom manufacturers and exporters of chemical products used in the manufacture of soaps, perfumery, paints, paper and pharmaceuticals. (Ref. No. 697.)

Nitrocellulose Lacquers in Japan

THE demand for industrial lacquer in Japan is increasing rapidly with the industrial development of the country. In the past, the principal source of demand for industrial lacquer has been the automobile. There are approximately 96,000 automobiles in Japan, of which, owing to the high duty, operating costs, and difficulties of securing licenses, only 6 per cent. is privately owned, the remainder being either commercial machines or vehicles for hire. The great majority of automobiles used in Japan are American. The automobile lacquer industry is, however, an exceedingly undependable source of demand, since the majority of Japanese owners of taxis and commercial vehicles do not seem interested in maintaining the appearance of their automobiles. Recently the lacquer industry has been endeavouring to open up new and more satisfactory fields of demand. It is estimated that in the future the greatest source of demand will arise in furniture and building construction, although in this field industrial types of lacquer will encounter competition with the ancient forms of Japanese lacquer. Approximately 70 per cent. of the nitrocellulose lacquers consumed in Japan is imported from abroad, importations coming almost entirely from the United States. The remaining 30 per cent. is manufactured domestically by some 10 different plants.

The Ceramic Industry in Canada

THE National Development Bureau, Deaprtment of the Interior, at Ottawa, has just issued an important new Memorandum dealing with the ceramic industry in Canada, which has been prepared as a foundation for an intensive survey of the possibilities presented in Canada for the expansion of the clay products industry. This memorandum gives data relative to the production of clay products in Canada, imports, exports, tariffs, fuels, labour costs, freight rates, etc., and shows where raw material can be obtained. A copy of the memorandum can be consulted by persons interested at the Reference Library, Canada House, Trafalgar Square, London, S.W.1.